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Fertility Transition in Nepal

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FERTILITY TRANSITION IN NEPAL

Editors

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*Based on the conference on
Fertility Transition in Nepal: Changing Context and Dynamics
Kathmandu*

**CENTRE FOR NEPAL AND ASIAN STUDIES
TRIBHUVAN UNIVERSITY
Kirtipur, Nepal**

July 1998

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PREFACE

EMERGING EVIDENCE suggests that fertility in Nepal has begun to decline. This change in fertility represents a major social transformation underway in society; it indicates a transition in the lives of women and their families and suggests the increasing effectiveness of the population and family planning programs in the country. This transition is indicative of gradual changes in values, norms and practices. The pre-established cultural scripts are being transformed and a new culture of contraception and reproductive behavior is evolving. The exact magnitude and timing of the fertility transition remain uncertain. Furthermore, the context and relative importance of factors contributing to the change have not been fully examined.

During the 20-year period, 1976-1996, four comparative national fertility surveys were conducted. In addition, censuses and various other surveys provide further information for gaining insights on the fertility transition. The national surveys together with more in-depth anthropological, social and economic studies provide excellent materials to review changes in fertility and to understand the context and dynamics of the changes now underway in the country. These materials also form the basis for stock-taking and understanding the advances made in research, data collection and analysis of fertility change in Nepal. Finally, this collective attention to fertility change could serve as a catalyst and an impetus for further research focusing on changes in reproductive behavior.

Against this background, an international conference "Fertility Transition in Nepal: Changing Context and Dynamics" was organized jointly by Tribhuvan University's Centre for Nepal and Asian Studies (CNAS) and Family Health International (FHI) on 25 and 26 November 1997 in Kathmandu. The objectives of the conference were: (1) to assess and evaluate changes in the patterns and levels of fertility in Nepal; (2) to analyze and discuss the changing context and dynamics of the fertility transition; and (3) to draw implications from these changes.

The conference focused on three main areas—levels and trends of fertility, methodologies for analyzing fertility changes, and factors contributing to fertility change. The participants of the conference were: faculties engaged in teaching and/or conducting research on population at their respective institutions, researchers from private sector leading research organizations, journalists representing leading newspapers, and selected senior level officials from relevant ministries and organizations of the Government. Altogether about 70 persons attended the scientific sessions of the conference. The conference assumed a special significance because it was the first time that those interested and knowledgeable about fertility analysis in Nepal had gathered together to collectively review the evidence and discuss the fertility transition underway.

Professor John C. Caldwell gave the keynote address. The other speakers who addressed the inaugural session of the conference included, Professor Kamal K. Joshi, Vice-chancellor, Tribhuvan University, Professor Prem K. Khatry, Executive Director, Centre for Nepal and Asian Studies, Dr. Kalyan R. Pandey, Director General of Health Services, Ministry of Health, and Dr. Glenn L. Post, Chief, Office of Health and Family Planning, U.S. Agency for International Development Mission/Nepal.

This volume represents selected papers presented at the conference. The papers originally prepared for the conference were revised by the authors in light of comments from conference participants and from subsequent reviewers. John C. Caldwell's paper is based on the keynote address. Robert D. Retherford and Shyam Thapa attempt to assess, using various methodologies, the levels and trends of fertility over the years. Tom Fricke and Dilli R. Dahal utilize the "micro demographic research approach" to explore the beginning of the fertility transition of one ethnic group. By adapting a similar methodology, Debendra Karki (who was unable to present the paper at the conference) examines the changing sociocultural and economic context triggering fertility control in a village in Eastern Nepal. Ram Hari Aryal looks at the fertility transition in a sample of women in the capital city, Kathmandu. Devendra Shrestha examines changes in the first birth interval for a community near Tribhuvan University. Based on data from national surveys, Laxmi Bilas Acharya analyzes socioeconomic and demographic factors associated with fertility changes at two points in time. Bhim Subedi explores the regional patterns of fertility differentials. In two separate papers, S. Philip Morgan, Bhanu B. Niraula, Shara G. Neidell, Dovan Lawati, and Sharon

Stash examine the context and influence of women's autonomy on reproductive behavior. John Cleland tries to delineate the factors that trigger fertility transition across societies.

One of the expected outputs of the conference was updated reference materials for use in teaching and research. This special issue of *Contributions to Nepalese Studies* is aimed at meeting this objective. We hope the readers will find the volume useful in teaching and in furthering their own research regarding the social transformations being brought about by the onset of what might be referred to as a quiet reproductive revolution in Nepal.

Dilli R. Dahal and Shyam Thapa representing CNAS and FHI respectively, served as coordinators of the conference. They thank many colleagues, Dr. Ram Hari Aryal in particular, for their assistance during the various stages of the conference. The participants deserve special thanks for their interest and time. Thanks are also due to Dharma R. Shakya and Bijayswor Shrestha for layout and word-processing. We gratefully acknowledge the support provided by the United States Agency for International Development for the conference and towards the production of this volume. Finally, we thank the Centre for Nepal and Asian Studies, Professor Prem K. Khatry in particular, for their cooperation and collaboration in organizing the conference and inviting us to serve as guest editors of this volume.

July 11, 1998

The Editors

The Global Fertility Transition and Nepal

John C. Caldwell

Our knowledge of the global fertility transition has increased greatly in recent times. There are three major sources which compare fertility movements across a range of countries. The first was the European Project of Princeton University's Office of Population Research, reported in a range of papers and books and summarized in Coale and Watkins (1986). The second has been the inclusion in the various revisions of *World Population Prospects*, brought out by the United Nations Population Division of demographic estimates for each country beginning with the quinquennium 1950-55 (United Nations, Various dates). The third is a recent attempt by Bongaarts and Watkins (1996) to use both these United Nations data and others on human development to analyze the timing of the onset of fertility decline.

We now have a panorama of these onsets as they occurred in nearly every country of the world outside sub-Saharan Africa. Even in the latter, fertility is now falling through the whole of Southern Africa and Kenya, while such declines may be incipient in many other countries. This panorama covers two centuries from the first onset of fertility decline in France in the late eighteenth century to the Nepalese transition which dates only to the last few years. Nepal, as measured by per capita income, is the poorest country in the world where fertility is now falling, although it is probably no poorer than Bangladesh was

when the decline began there and perhaps little different from France when its fertility began to fall.

The onset of fertility declines seems to be partly a diffusion process, especially within countries where rural birth rates often begin to decline not long after the urban decline begins but in social and economic conditions that are usually very different.

The discontinuities in the spread of fertility variations are equally interesting. There is still no satisfactory explanation why France's fertility decline began so early and why no other European country followed for generations. The answer may lie more in the realm of ideas than in socio-economic indices, and may be mostly concerned with the battering that orthodox religion and morality experienced in the revolutionary years. There is also a gap between the onset of most Western fertility transitions, the majority of which had begun by the beginning of the present century, and those of the Third World which were delayed until the 1960s. The exception here is Japan, where a decline was under way by 1930, thus giving support to socio-economic, rather than cultural, theories of fertility decline.

Before turning to Nepal, it is pertinent to examine certain general propositions regarding the fertility transition.

Diffusion

In the European fertility transition, diffusion clearly occurred from town to city and from the Northwest to the Southeast. What was diffused may have been contraception or the justification of its use, or it may have been the idea of the small family and its justification. Alternatively it may have been, more broadly, ways of living and attitudes towards life. This issue has emerged recently in the demonstration by Bongaarts and Watkins (1996) that the onset of the Asian transition spread across Asia, progressively affecting countries with ever-lower socio-economic levels (as measured by the Human Development Index). Their explanation is that this occurred basically because of grass-roots communication, especially between women.

We attempted to discover how Bangladesh was affected by other countries in Asia (Khuda et al., In press). It became clear that women had not talked to women across Bangladesh's international borders. Indeed, because of *purdah* in rural areas, few had discussed family planning with anyone but their sisters and sisters-in-law. Most had learnt of these matters from family planning workers or health center staff. The question, therefore, resolved itself into the sources of

knowledge and the inspiration for action of these people. The answer was that the phenomenon had been driven by a fairly efficient bureaucratic machine where the members were increasingly convinced about the truth of the message they were promulgating.

How, then, had this message entered Bangladesh and how had it been reinforced? It appeared from interviews with men, now old, who had been involved from the start, that the attitudes of the old colonial British Indian Civil Service were never pro-growth and, indeed, had a Malthusian tinge. After partition, both India and Pakistan moved towards national family planning programs and President Ayub Khan laid the groundwork for a more efficient family planning program in the late 1960s. Aspiring senior public servants were trained to believe in family planning in administrative colleges. The East Pakistan college was at Comilla which ran its own family planning program. The public servants from that era survived the independence struggle and subsequent disorders and changes of government. Indeed, these disorders hid the essential cultural unity of the new Bengali state and the lack of major ideological differences between the various governments. The public service developed the family planning program on the basis of an assumed national consensus and politicians were pleased to let them do so. The ideological base for this came partly from the recurrent crises and the awareness of the country's population densities. But diffusion was all-important. It took the form of politicians and public servants attending international meetings on the subject, learning of successes in other Asian countries, and absorbing messages and funding from the international community and from American foundations. The domino effect of the onset of Asian fertility declines has to be seen in terms of the region as a whole and in terms of comparisons between different national efforts. It also has to be seen in terms of the willingness of Asian governments to take on moral leadership in the family planning area and the lack of strong religious or cultural resistance (Caldwell, 1993).

Myths and Facts about the Global Demographic Transition

The new data bases have allowed us to test generalizations which have been made about the course of the global fertility transition (Caldwell and Caldwell, 1998).

The first thesis is that, as fertility transitions begin in each major world region, they move through the regions at ever-greater speed. This proposition is now open to severe doubt. The impression

that the first transition, the European one, was so prolonged rests almost entirely on the early French transition. We measured the speed of transitions by determining the time period for each region between when 25 per cent of its countries had begun fertility decline and when 75 per cent had done so. This interquartile range was only 13 years in Europe, a similar period to that found in ESCAP Asia, North Africa and the Middle East. Exceptionally fast regional transitions were found only in Latin America, where there were fewer national family planning programs and massive opposition from the Catholic Church. In terms of comparisons with Asia, the onset of transition in Latin America was late as measured by socio-economic indices. There was, thus, a pent-up demand and, when the dam was breached, fertility decline was rapid.

The other general thesis is that over time national fertility declines have become more rapid. This generalization was tested for each region by measuring the average time that it took for fertility to fall from 10 to 40 per cent of its original level. In Europe, including France, the period was 29 years; without France it was 25 years. Later fertility transitions before the Second World War were somewhat faster: 17 years in English-speaking countries of overseas European settlement; 22 years for temperate Spanish-speaking countries of overseas European settlement; and 15 years for Japan. But, in the second half of the present century, fertility declines of this extent were accomplished in both ESCAP Asia and Latin America in only 12 years. This may not continue to be the situation. More recent declines of this magnitude have taken 15 years in both North Africa and the Middle East and fragmentary evidence suggests that they may take longer still in sub-Saharan Africa.

The Mechanics of Global Fertility Transition

The onset of fertility transition in each region generally has taken place over time from the more developed to the less developed countries. The exception is Latin America where most onsets occurred between 1965 and the early 1970s with little regard to the level of development.

The best examples of the largely spontaneous diffusion of new ideas and new behavioral practices within homogeneous culture areas is provided by long-distance diffusion across the face of the world. The prime example is probably that of the English-speaking countries where marital fertility decline began in the United States, English-speaking

Canada, Australia and New Zealand within a total span of three or four years and very soon after the first declines in Britain. Similarly, fertility decline in Argentina and Uruguay closely paralleled in time the transitions in Spain and Italy. In the 1950s, before the general Third World fertility transition began, fertility began to fall at similar times in a range of islands stretching from the Caribbean to the Indian and Pacific Oceans.

It is the ESCAP Asian fertility transition which fits the model outlined by Bongaarts and Watkins (1996). Here declines successively began later and at ever-lower socio-economic levels. Diffusion, at least at the levels of governments and the elites, was clearly important. As more countries exhibited fertility declines, international agencies, when dealing with the remaining countries, could take the need to begin such decline as a developmental priority. Where there were strong social hierarchies, as in Hindu South Asia, it was likely both that the higher socio-economic groups would adopt family planning earlier and that they would see it as a national necessity that the lower classes should follow suit.

Nepal

I have come here to learn about Nepal rather than to offer analysis. There are reasons why Nepal is of interest to the demographic theorist. The first reason is one we have already given, namely that it is the poorest country in the world that is now undergoing a fertility transition, and it is doing so with absolutely no pressure or coercion.

The second reason is Nepal's unique topography and hence social heterogeneity. The global fertility transition has been associated with the erection of a global economy and society. The onset of fertility transition has followed the conversion of economies into ones where practically all transactions are monetized, where children go to school, where modern medical facilities are easily available, where an increasing number of mothers receive trained health professional assistance when giving birth, and where infant and child mortality rates are falling to at least moderate levels. The global society is connected by trafficable roads along which trucks carry the goods that make the global economy possible and along which buses carry people seeking wage-paid work elsewhere. It is in this cost-accounting environment that children begin to become expensive and a matter requiring choice in the allocation of resources.

Nepal, perhaps more than any other country, is two societies, with the people of the valleys and the lesser slopes, where roads and schools have penetrated, being part of the global network. It is here that there should be a growing demand for fertility decline and a declining birth rate. The people of the still largely inaccessible hills almost certainly live in a society where there are still gains to be made from having large families. Fricke (1997) has presented evidence to show that this is indeed so, and we look forward to seeing fertility maps of the country at this conference which justify these conclusions nationwide.

The third aspect of Nepal's fertility transition that is noteworthy is the high level of dependence for fertility control placed upon sterilizing operations. If this really reflects demand, it supports the assertion often heard in India that sterilization largely meets the requirements of a predominantly rural, South Asian society. If it is policy choice, then it raises questions, especially ones about whether the Nepalese fertility decline is as steep as it might be. The experience of Bangladesh shows that every new contraceptive choice accelerates the fertility decline. There is a demand for reversible methods and there is a fear of operations. It might be argued that Bangladesh has benefited from a high level of per capita international aid for family planning. There seems to be no reason why Nepal, with its relatively small population, should not be able to obtain assistance of this magnitude.

Such assistance would certainly hasten fertility decline in those parts of Nepal which have become part of the global economy and society. But, for a nationwide fertility transition, the all-weather roads, the schools and the health centers will have to penetrate to every part of the country. This is a developmental challenge more extreme and expensive than is faced by most countries.

References

- Bongaarts, John and Susan Cotts Watkins. 1996. "Social interactions and contemporary fertility transitions." *Population and Development Review* 22(4): 639-682.
- Caldwell, John C. 1993. "The Asian fertility revolution: Its implication for transition theories." In *The Revolution in Asian Fertility: Dimensions, Causes, and Implications*. Eds. Richard Leete and Iqbal Alam. Oxford: Clarendon Press. Pp. 299-316.
- Caldwell, John C. and Pat Caldwell. 1998. "Regional paths to fertility transition." Paper presented at Conference on Global Fertility Transition,

Bellagio Center, Rockefeller Foundation, 18-22 May.

Coale, Ansley J. and Susan Cotts Watkins (eds.). 1986. *The Decline in Fertility in Europe*. Princeton: Princeton University Press.

Fricke, Tom. 1997. "Culture theory and demographic process: Toward a thicker demography." In *Anthropological Demography: Toward a New Synthesis*. Eds. David I. Kertzer and Tom Fricke. Chicago: University of Chicago Press. Pp. 248-277.

Khuda, Barkat-e-, John C. Caldwell, Bruce K. Caldwell, Indrani Pieris, Pat Caldwell, and Shameem Ahmed. In press. In *The South Asian Fertility Transition*. Eds. James Phillips and Zeba Sathar. Oxford: Clarendon Press.

United Nations. Various dates. *World Population Prospects*. New York: Department for Economic and Social Information and Policy Analysis, Population Division.

Fertility Trends in Nepal, 1977-1995

Robert D. Retherford and Shyam Thapa

Introduction

This article presents estimates of fertility trends in Nepal over the period 1977-95, derived from data from two national surveys—the 1991 Nepal Fertility, Family Planning and Health Survey (NFFPHS) and the 1996 Nepal Family Health Survey (NFHS). Both of these surveys were conducted as part of the worldwide Demographic and Health Surveys (DHS) program. Each of the two surveys yields an estimated fertility trend during the 15-year period (or, in the case of some measures, the 10-year period) preceding the survey. The two trends overlap during some of those years. If the data are of high quality, the two trends should coincide during this period of overlap. In fact they do not coincide. Analysis of the pattern of discrepancies provides insight into the nature of reporting errors in each of the two surveys and a more accurate assessment of the true trend of fertility than can be obtained from either survey alone.

The fertility measures for which trends are estimated include age-specific fertility rates (ASFRs), the conventional total fertility rate calculated from ASFRs (TFR), period parity progression ratios (PPPRs), the total fertility rate calculated from PPPRs (TFR_p), and the total marital fertility rate calculated from PPPRs ($TMFR_p$). The part of the analysis that deals with trends in the TFR and ASFRs builds on an earlier article written before the 1996 NFHS data became available (Dangol, Retherford, and Thapa, 1997).

Data

The 1991 Nepal Fertility, Family Planning and Health Survey

The NFFPHS was a national survey based on a representative sample of households throughout the country (Ministry of Health, 1993). The sample included completed interviews for 24,745 households, and, within these households, 25,384 ever-married women. The sample was *de facto*, meaning that persons who slept in the household the night before the interview, including visitors, were interviewed. The survey included a household schedule, with the household head or any other knowledgeable adult in the household responding for the entire household. It also included an individual schedule administered to individual ever-married women age 15-49 within the sampled households.

The NFFPHS was conducted over a seven-month period, from August 1991 to February 1992. Most of the interviewing was conducted during late 1991. The year before the survey falls mainly in 1991 and is labeled as such in tables that identify time periods before the survey.

The 1996 Nepal Family Health Survey

The NFHS was also a national survey based on a representative sample of households throughout the country (Ministry of Health, 1997). The sample for this survey was considerably smaller than the sample for the 1991 survey. The 1996 sample included completed interviews for 8,082 households, and, within these households, 8,429 ever-married women age 15-49. The sample was again *de facto*, and the survey again included a household schedule and an individual schedule.

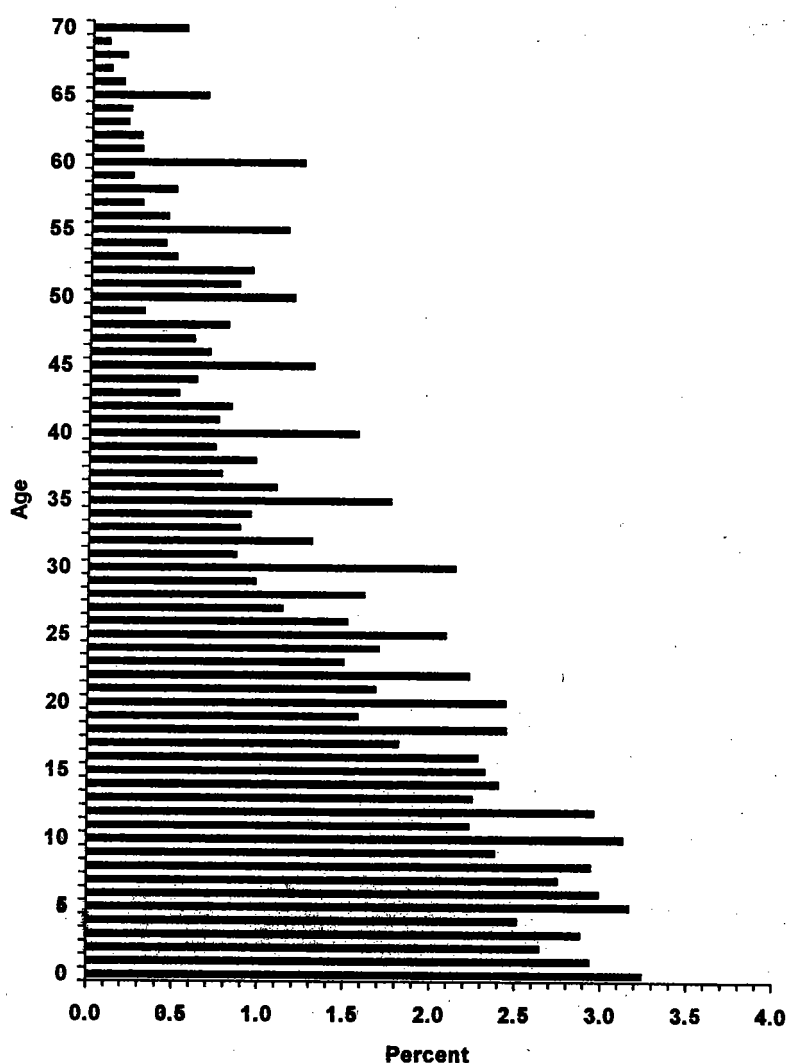
The NFHS was conducted over a six-month period, from mid-January to mid-June 1996. The year before the survey falls mainly in 1995 and is labeled as such in tables that identify time periods before the survey.

Quality of Data on the Ages of Women and Children

Accurate reporting of ages—especially children's ages—is essential for accurate estimation of past fertility trends from a single survey. This is easily seen by considering as an example the impact of heaping on age 10 on the fertility estimates. Because children age 10 were born during the 11th year before the survey, heaping on age 10 results in an overestimate of births during the 11th year before the survey, so that the fertility estimates for that year are too high.

Figures 1 and 2 graph the age distribution for females for the 1991 NFFPHS and the 1996 NFHS. Females are shown because age-specific fertility rates are calculated for women. In both surveys, the proportion of infants (children below one year of age) is considerably higher than the proportions of children age 1, 2, 3, or 4, as shown in

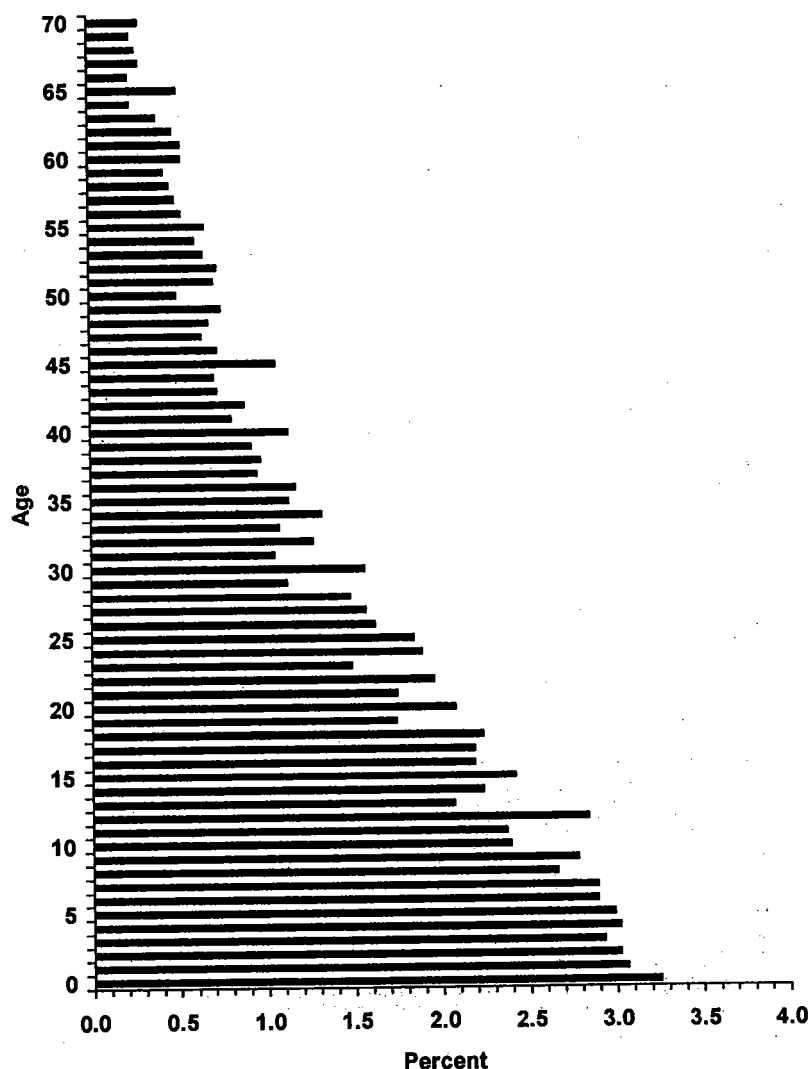
Figure 1 Female age distribution: 1991 NFFPHS



Figures 1 and 2. This may occur not only because of population growth and the cumulative effects of infant and child mortality over successive ages, but also because of emphasis during the training of interviewers on

the importance of complete and accurate identification of infants for purposes of computing infant mortality rates and other health indicators for infants. It is likely that the number of children age zero (below one year of age) is reported fairly accurately in both surveys.

Figure 2 Female age distribution: 1996 NFHS



Figures 1 and 2 show considerable age heaping on ages 8, 10, and 12 in the 1991 survey and, to a much lesser extent, on ages 9 and 12 in the 1996 survey. Heaping on ages 8, 10, and 12 is commonly

observed in south Asian countries (Retherford and Alam, 1985), and in this respect the 1991 NFFPHS is fairly typical. The heaping on age 9 in the 1996 NFHS is not typical. At ages beyond 12 there is a consistent pattern of heaping on ages ending in the digits 0 or 5 in the 1991 survey, but not nearly as much in the 1996 survey.

The 1996 survey shows no heaping at all on ages 10 and 50, which is surprising, inasmuch as most surveys show considerable heaping on these ages. A reasonable interpretation of this finding is that, in the 1996 survey, the training of interviewers placed more than the usual amount of emphasis on the importance of accurate age reporting. Indeed, the moderate heaping on ages 9 and 49 in the 1996 survey suggests a tendency on the part of interviewers to overcompensate by moving some girls reported as age 10 to age 9 in order to avoid heaping on age 10, and some women reported as age 50 to age 49 in order to avoid heaping on age 50. Discussions with personnel from New ERA, the agency that collected the data for the 1991 and 1996 surveys, confirm that the training on how to collect accurate age data was much more intensive in the 1996 survey than in the 1991 survey.

There is a big jump in the proportion at age five in the 1991 survey but not in the 1996 survey. Some of the heaping on age five in the 1991 survey may simply reflect the same kind of preference for ages ending in 0 and 5 that is so evident at adult ages. However, heaping on age five may also occur partly because some interviewers in the 1991 survey may have tended occasionally to move a child below age five to age five in order to avoid having to ask a large block of questions asked about births since a cutoff date. This block of questions pertains to breastfeeding, health, and vaccinations, and the group of births about whom these questions were asked corresponds approximately to children below age five at the time of the 1991 survey.

In the 1996 survey the cutoff age for asking this block of questions corresponds to children who ranged in age from three years and nine months to four years and three months at the time of the survey. If interviewers occasionally moved a child up in age in order to avoid asking this block of questions, there should be a deficit at three and some heaping on ages four and five. This pattern is observed in Figure 2, but it is not very pronounced.

One reason why heaping on ages four and five is so modest in the 1996 survey may be that in the 1996 survey, unlike the 1991 survey and most DHS surveys in other countries, the household interview and the individual interview were conducted by different interviewers. In the 1996 survey, each team comprised three female interviewers, a male

interviewer, a female field editor, and a field supervisor who was either male or female. The male interviewer administered the household questionnaire, and the female interviewers administered the individual questionnaire. Interviewers were instructed not to compare results from the two interviews. The use of different interviewers for the household interview and the individual interview was intended to discourage interviewers from displacing births to earlier years (equivalent to shifting children to older ages) in order to avoid having to ask the block of questions pertaining to births since the cutoff date in the individual questionnaire. It was reasoned that interviewers would be less likely to shift births, because such shifting might produce a detectable difference between a child's age recorded in the household listing during the household interview and the age implied by the child's birth date in the birth history recorded during the individual interview. The lack of significant heaping on ages four and five in the 1996 survey suggests that interviewers' awareness of possible cross-checks had the desired effect.

In general, Figures 1 and 2 indicate that age reporting was considerably more accurate in the 1996 survey than in the 1991 survey, not only at childhood ages but also at adult ages. Because the improvement in age reporting is observed throughout the age distribution, and because the time interval between the two surveys is so short, this improvement cannot be attributed to respondents' rising educational levels or to their improving knowledge of their own ages. The only plausible explanation is improvements in the way the 1996 survey was organized and run. Again, a contributing reason for the better reporting of adult ages may be the use of separate interviewers for the household interview and the individual interview. Interviewers were aware that discrepancies in reported age between the household schedule and the individual schedule would be apparent not only for young children but also for older children and ever-married women.

The trend in the sex ratio at birth is another useful indicator of data quality. Because there is considerable preference for sons in Nepal, women who forget to mention children who have died or moved away are more likely to omit girls than boys. If such omissions are a problem, then one expects the sex ratio at birth, as ascertained from the birth histories, to become progressively more male in earlier years when omissions are more likely to occur. The sex ratio at birth is largely biologically determined and is usually close to 1.05 male births for every female birth. If female births are omitted, the ratio should be higher than 1.05. Table 1 shows that in both the 1991 survey and the 1996 survey

the sex ratio at birth does not become progressively more male in earlier years. For the 15-year period as a whole preceding each survey, the sex ratio at birth is 1.04, the same in each survey. This finding suggests that few births during this period were omitted by respondents in either survey.

It is still possible that interviewers (rather than respondents) occasionally omitted births since the cutoff date, without regard to the sex of these births, in order to avoid asking the large block of questions referred to earlier. Sex ratios at birth would not detect this kind of omission by interviewers. However, such omissions are unlikely in the 1996 survey, because the use of separate interviewers for the household interview and the individual interview meant that such omissions might be detected. All in all, it appears that the strategy of using separate

Table 1 Male births, female births, and the sex ratio at birth during the 15-year period before each survey: 1991 NFFPHS and 1996 NFHS

Survey and year	Male births	Female births	Sex ratio at birth
1991 NFFPHS			
1977-81	9919	9619	1.03
1982-86	11945	11339	1.05
1987-91	11013	10533	1.05
1977-91	32877	31492	1.04
1996 NFHS			
1981-85	3060	2999	1.02
1986-90	3582	3406	1.05
1991-95	3698	3574	1.03
1981-95	10340	9978	1.04

interviewers for the household interview and individual interview probably helped to prevent displacement and omission of births and generally to improve the quality of the age data in the 1996 survey.

There are additional reasons, equally and perhaps even more important, why the age data are so much better in the 1996 survey than in the 1991 survey. The training of interviewers in the 1996 survey lasted one month and, as already mentioned, strongly emphasized the importance of collecting accurate age data. Trainees were drilled at length on probing for age when respondents initially reported ages ending in 0 or 5. This was followed up during the field work with extensive use of "field check" tables, which provided quick feedback to

interviewers on problems, such as excessive age heaping, while interviewers were still in the field. This kind of close and continual monitoring was probably a very important factor contributing to the comparatively high quality of the age data in the 1996 survey. The 1996 survey was also characterized by much closer supervision of interviewers, which was possible because of the much smaller sample size. Moreover, editors and supervisors were selected on the basis of best performance in the training rather than being pre-selected, and this probably added to the quality of supervision. Also, again partly because of the smaller size of the 1996 survey sample, a much higher proportion of interviewers in the 1996 survey were already experienced in the collection of survey data (Ban, 1997).

Figure 3 examines the quality of reporting of the number of children ever born in the two surveys. If women forget to mention some children (e.g., children who have died or moved away), one expects this to occur more frequently among older women than among younger women. Such omissions are sometimes reflected in a mean number of children that declines with age after about age 40. Figure 3 suggests that omissions are not a serious problem in either the 1991 or the 1996 survey, inasmuch as the mean number of children ever born attains a maximum at age 49 in both surveys. Moreover, this maximum is slightly above six children per woman, somewhat higher than the current level of the total fertility rate, as one would expect if fertility is declining. (The total fertility rate is a period measure that reflects recent fertility, whereas mean number of children ever born at age 49 reflects fertility that mostly occurred in the more distant past.) As we shall see later, the total fertility rate in recent years is estimated to be well below six children per woman.

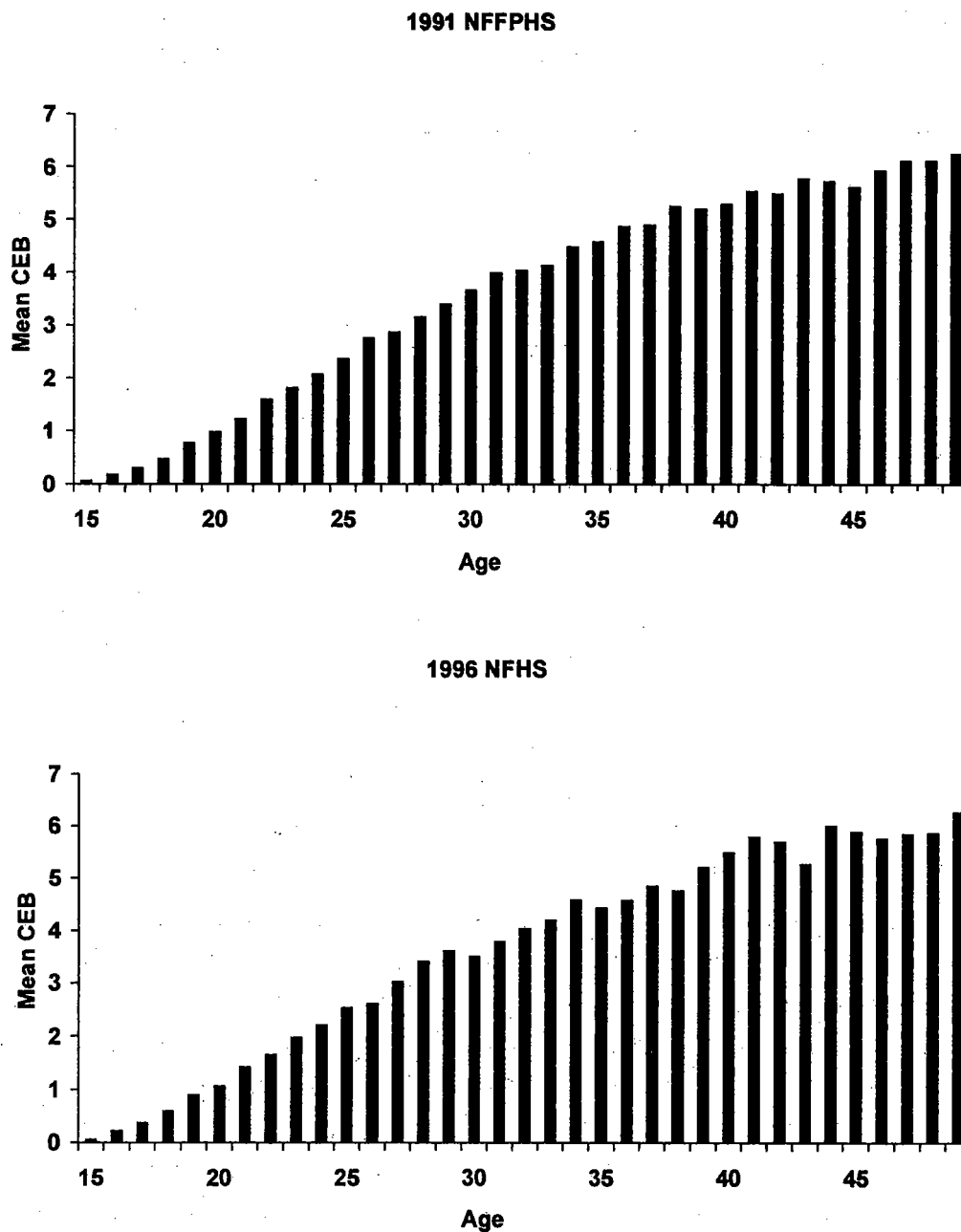
In closing this section, it should be noted that a recent assessment of the quality of age data in DHS surveys in 40 countries ranks the 1996 Nepal Family Health Survey fifth best (i.e., fifth lowest score on Myers' index) (Ayad et al., 1997). Because of the relatively high quality of the age data in the 1996 NFHS, we expect fertility trends estimated from the 1996 NFHS to be more accurate than fertility trends estimated from the 1991 NFFPHS.

Distribution of the Sample by Residence and Education

In this article we estimate fertility trends not only for the total population but also by urban-rural residence and by education. Table 2 shows that, among women age 15-49, the proportion urban was 8

percent in 1991 and 9 percent in 1996. Over the same period, the proportion with no education decreased from 79 to 73 percent. The

Figure 3 Mean number of children ever born to ever-married women by single years of age: 1991 NFFPHS and 1996 NFHS



proportion with at least some primary education increased from 9 to 12 percent, and the proportion with at least some education beyond the primary level increased from 12 to 15 percent.

Both surveys over sampled the small urban population in order to obtain adequate numbers of respondents for analysis. The correct proportions were restored by means of weights during the course of the analysis. The percentages in Table 2 and all subsequent tables and graphs in this article are based on the weighted sample.

Table 2 Distribution of the sample by residence and by education: women age 15-49 (both never-married and ever-married), 1991 NFFPHS and 1996 NFHS

Characteristic	1991 NFFPHS	1996 NFHS
Residence		
Urban	8	9
Rural	92	91
Education		
No education	79	73
Primary	9	12
Beyond primary	12	15

Methodology

Our main methods for estimating fertility are the birth history method and the own-children method. In addition, we use methodology developed by Feeney to estimate period parity progression ratios (PPPRs) and total fertility rates and total marital fertility rates derived from PPPRs (Feeney, 1986; and Feeney and Saito, 1985).

Birth History Method

In the birth history method, as applied here, one simply counts births by age of mother as reported in the birth histories for each year up to the fifteenth year before the survey. Similarly, woman-years of exposure to the risk of birth are counted by woman's age for each year up to the fifteenth year before the survey. The births by age of mother in any given year are then divided by woman-years of exposure by woman's age in that same year to yield estimates of age-specific fertility rates (ASFRs) for that year. Total fertility rates (TFRs) are obtained by summing ASFRs in five-year age groups and multiplying the sum by five. ASFRs can similarly be calculated for longer time periods, such as five-year time periods.

Birth histories were collected only for ever-married women age 15-49. When calculating ASFRs for all women, regardless of marital

status, it was assumed that never-married women have had no births. This assumption is reasonable for Nepal, where very few births occur outside marriage. In the present application of the birth history method, base calculations were done in months. Rates were converted to a yearly basis only at the end of the calculations.

Because birth histories were collected from women only up to the age of 49, we cannot calculate a complete set of ASFRs for earlier years. For example, the oldest women in the sample, who were age 49 at the time of the survey, were only 44 five years earlier. Therefore, one cannot calculate an ASFR for women 45-49 for years earlier than five years before the survey. In this article, we are interested in estimating fertility during the 15-year period preceding the survey. Fifteen years previously, the oldest woman in the sample was 34 years old. If we want comparable fertility measures for each of the 15 years before the survey, we cannot make use of fertility at ages 35 and older. A suitable summary measure of fertility that is comparable over the entire period is CFR(35), i.e., the cumulative fertility rate up to age 35. This measure is calculated by summing ASFRs in five-year age groups from 15-19 to 30-34 and multiplying the sum by five.

Own-Children Method

The own-children method is a reverse-survival method for estimating ASFRs for years prior to a census or household survey. In the present instance, the method is applied to the NFFPHS and NFHS household samples. Enumerated children are first matched to mothers within households, based on answers to questions on age, sex, marital status, and relation to head of household. A computer algorithm is used for matching. The matched (i.e., own) children, classified by their own age and mother's age, are then reverse-survived to estimate the number of births by age of mother in each of the 15 years before the survey. Reverse-survival is similarly used to estimate the number of women by age in previous years. After adjustments are made for unmatched (i.e., non-own) children, age-specific birth rates are calculated by dividing the number of reverse-survived births by the number of reverse-survived women.

Estimates are normally computed for each of the 15 years or groups of years before the survey. Estimates are not usually computed further back than 15 years because births must then be based on children age 15 or older at the time of enumeration, a substantial proportion of whom (especially girls who leave the household upon marriage) do not

reside in the same household as their mother and hence cannot be matched. All calculations are done initially by single years of age and time. Estimates for grouped ages or calendar years are obtained by appropriately aggregating single-year numerators (births) and denominators (women) and then dividing the aggregated numerator by the aggregated denominator. Such aggregation is useful for minimizing the distorting effects of age misreporting on the fertility estimates (Cho et al., 1986).

Reverse-survival requires life tables. Life tables are available for 1981 and 1991 (CBS, 1995). Life tables for other years were obtained by linearly interpolating or extrapolating life-table age-specific probabilities of dying which were then used to calculate complete life tables. Life tables for 1981 and 1991 are published for males and females separately but not for both sexes combined, so we calculated the combined life table from the male and female life tables. Life tables by urban-rural residence and education are not available, so we used the same life tables regardless of urban-rural residence or education. We did not make any adjustments for age misreporting.

The own-children method, which is based on data from the household sample, is not constrained by the problem of age truncation at age 50. It allows estimation of TFRs for each of the 15 years prior to each survey. For this reason, it is our preferred method for estimating fertility trends from the 1991 NFFPHS and the 1996 NFHS.

Method for Estimating Period Parity Progression Ratios and Derived Measures

We also make use of period parity progression ratios, which are useful for analyzing the family-building process. A woman's parity is defined as the number of children that she has ever borne. A parity progression ratio (PPR) is defined as the proportion of women of specified parity who eventually go on to have another child. Although the concept of parity is normally defined in terms of birth events, it may be extended to include the event of a woman's own birth and the event of her own first marriage. This extension enables us to analyze "parity" transitions from birth to marriage and marriage to first birth as well as transitions from first birth to second birth, second birth to third birth, and so on.

A period parity progression ratio (PPPR) is a parity progression ratio that is calculated from a set of birth probabilities pertaining to a particular time period, which may be a single calendar year or a group of

calendar years before the survey. The birth probabilities are specified by duration in parity. A birth probability for women of specified parity and duration in parity (with duration measured in years) is estimated as the proportion of such women who progress to the next parity in one year. A period parity progression ratio is computed from these duration-specific birth probabilities by life table methods, in the same way that the probability of dying by a specified age is calculated from age-specific death probabilities in an ordinary period life table. (For methodological details, see Feeney, 1986; Feeney and Saito, 1985). To summarize, in this article a PPPR indicates the proportion of a synthetic cohort of women of specified parity who would ultimately progress to next parity if they were to experience the duration-in-parity-specific birth probabilities observed in the population during the time period under consideration.

The calculation of PPPRs incorporates the following simplifications: To count as progressing to first marriage, a woman must marry by age 40; to count as progressing from marriage to first birth, the first birth must take place within 13 years of marriage; and to count as progressing from any given birth to the next, the next birth must take place within 10 years of the preceding birth. Thirteen years was chosen as the cutting point for marriage to first birth in order to allow for delays in consummation of early marriages. The assumption is that women who do not have a first marriage or birth within the specified cut-offs are at negligible risk of having a first marriage or birth subsequently.

As discussed earlier, the total fertility rate (TFR) is conventionally calculated from age-specific fertility rates. A total fertility rate can also be calculated from a set of PPPRs as

$$TFR_p = p_B p_M + p_B p_M p_1 + p_B p_M p_1 p_2 + \dots \quad (1)$$

where p_B denotes the proportion who progress from birth to first marriage, p_M denotes proportion who progress from first marriage to first birth, and p_i denotes the proportion who progress from the i th to the $(i+1)$ th birth, $i = 1, 2, \dots$. In the application of this formula to Nepal data, this calculation is truncated at parity transition 15 to 16. Because of potential problems with small numbers of cases, the last three transitions (13→14, 14→15, and 15→16) are averaged, and these average values are substituted for the original values for these transitions. The total fertility rate calculated from PPPRs (TFR_p) usually differs somewhat from the total fertility rate calculated from age-specific fertility rates (TFR). Differences between TFR_p and TFR have been studied in depth by Feeney and Yu (1987).

A total marital fertility rate may be calculated from PPPRs as

$$\text{TMFR}_p = p_M + p_{Mp1} + p_{Mp1p2} + \dots \quad (2)$$

A potential problem in estimating PPPR-based fertility measures from the NFFPHS or the NFHS is that, except for the PPPR for the transition from birth to marriage (p_B), PPPRs are derived entirely from information in the individual questionnaire. Hence, these PPPRs, when estimated for several years back from the survey date, are subject to bias stemming from truncation of the individual sample of ever-married women at age 50.

In trying to understand how this bias manifests itself, let us suppose that we wish to estimate a set of PPPRs for the 15th year before either survey. Women age 49 at the time of the survey were age 34 in the 15th year before the survey, implying truncation at age 35. The question is, does this truncation at age 35 cause any difficulties in estimating PPPRs for that year? There would seem to be little problem in estimating PPPRs for transitions $M \rightarrow 1$, $1 \rightarrow 2$, and $2 \rightarrow 3$, since very few of these transitions take place after age 35. But higher-order transitions are more problematic. Consider, for example, the transition $6 \rightarrow 7$. The only women we can consider at starting parity 6 are women who reach this parity before their 35th birthday. Such women tend to be more fecund than women who reached parity 6 after their 35th birthday. Therefore, women who reached parity 6 before their 35th birthday can be expected to have a higher than average probability of going on to have a seventh child. This line of reasoning suggests that the effect of age truncation at age 50 at the time of the survey is to bias upward the estimates of parity progression ratios for higher-order transitions in earlier years. This upward bias is progressively greater the higher the starting parity and the further back the calendar year for which PPPRs are estimated. Thus, at these higher parities, our estimated declines in PPPRs will tend to be too steep.

It therefore seems prudent to extend the estimates backward in time only ten years instead of 15 years. Ten years ago, the oldest woman was age 39, implying truncation at exact age 40. Most women have completed childbearing by this age, so that the bias described above should be small, with the possible exception of PPPRs with very high starting parities of perhaps seven or higher. The formulae for TFR_p and TMFR_p suggest that the effect of such estimation errors on TFR_p and TMFR_p should be fairly small.

Findings

The analysis is organized as follows: First we will compare trends in CFR(35) during the 15-year period preceding each survey, estimated alternatively by the own-children method and the birth history method. The purpose of this comparison is to validate the subsequent use of the own-children method. As explained earlier, we prefer the own-children method over the birth history method, because results from the own-children method are not constrained by the problem of age truncation at age 50. Having validated the own-children method, we will move on to present results of applying the own-children method to the 1991 NFFPHS and the 1996 NFHS. This part of the article will include an analysis of overlapping trends in TFRs and ASFRs estimated from the two surveys. It also will include breakdowns of the fertility estimates by urban-rural residence and by education. Next we will combine each pair of overlapping TFR trends into a single trend, in an attempt to minimize the biases contained in the two trends estimated from each survey separately.

The remainder of the article will repeat much of the preceding analysis, using period parity progression ratios (PPPRs) in place of ASFRs, and the total fertility rate and the total marital fertility rate calculated from PPPRs (TFR_p and $TMFR_p$) in place of the conventional TFR. It turns out that the PPPR-based analysis provides some insights not afforded by the ASFR-based analysis.

Trends in CFR(35), Estimated Alternately by the Birth History Method and the Own-children Method

Figure 4 shows trends in the cumulative fertility rate up to age 35 [CFR(35)], estimated alternatively by the birth history method and the own-children method applied to the 1991 NFFPHS and to the 1996 NFHS. Figure 4 shows that the two methods yield substantially the same trend in CFR(35). The agreement is not quite as good 10-14 years before each survey as it is in years closer to the survey, indicating that results presented below for the period 10-14 years before the survey must be interpreted more cautiously than results for more recent years.

In the remainder of this article, ASFRs and conventional TFRs are estimated by the own-children method.

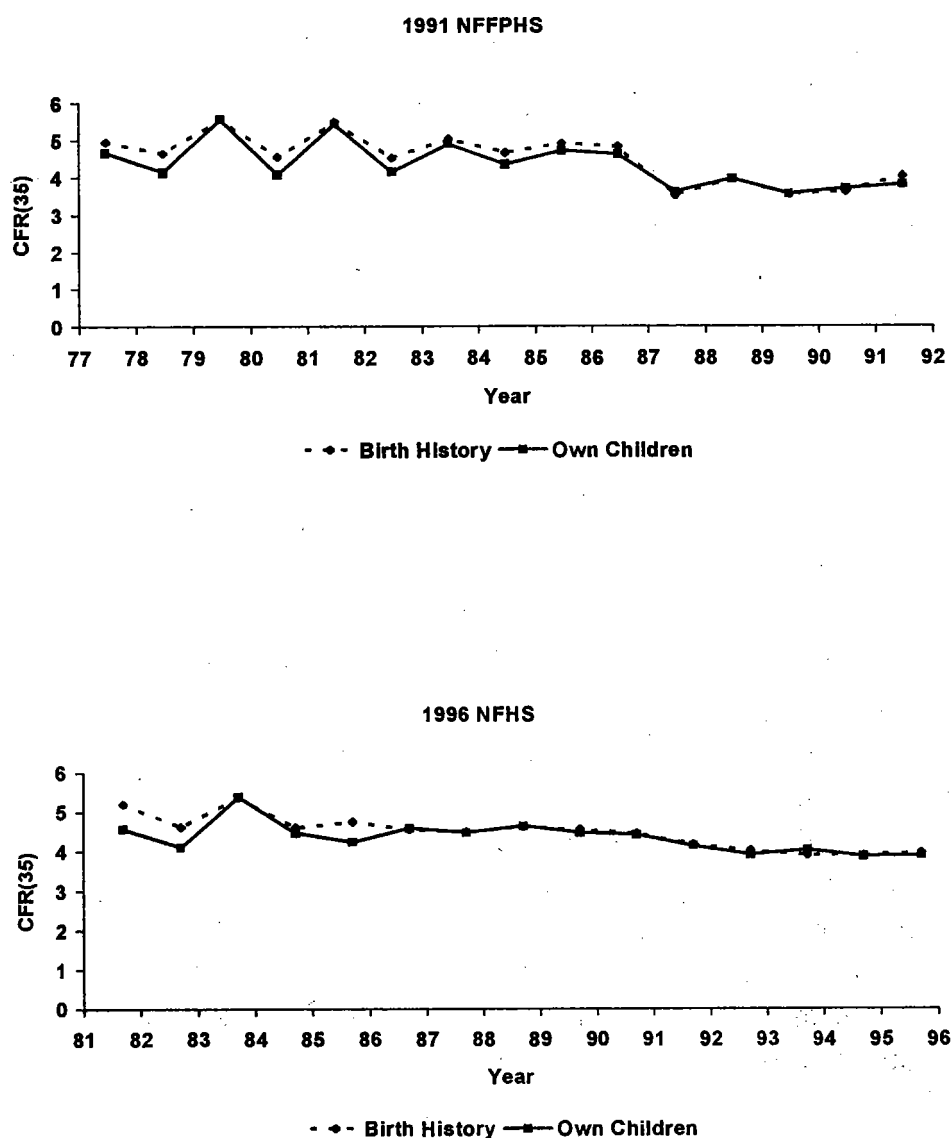
Trends in ASFRs and TFRs for the Whole Country

Table 3 shows trends in ASFRs and TFRs for the whole country, derived from the 1991 NFFPHS and the 1996 NFHS. The table

shows estimates for three 5-year time periods as well as the combined 15-year period immediately preceding each survey.

Looking first at the estimates of the TFR, we see that each survey separately yields a fairly steep decline in the TFR. The NFFPHS indicates that the TFR fell from 6.11 in 1977-81 to 4.71 in 1987-91, a decline of 1.40 children in only ten years. The NFHS indicates that the TFR fell from 5.68 in 1981-85 to 4.77 in 1991-95, a decline of 0.92

Figure 4 Trend in CFR(35), estimated alternatively by the birth history method and the own-children method: 1991 NFFPHS and 1996 NFHS



child in ten years. However, comparing the 15-year estimate of the TFR derived from the NFFPHS with the 15-year estimate of the TFR derived from the NFHS, we see that the TFR declined from 5.47 in 1977-91 to 5.27 in 1981-95, a decline of only 0.20 child in 4.2 years. The separation of 4.2 years is derived as the difference between the mean dates of interview in the two surveys. The between-survey estimate of the rate of decline in the TFR (.05 child per year) is considerably lower than either of the within-survey estimates of the rate of decline of the TFR (.14 child per year from the 1991 survey and .09 child per year from the 1996 survey). (Henceforth we shall refer to estimated trends based on 15-year aggregations from the two surveys as between-survey estimates.)

Table 3 also shows trends in ASFRs, which are graphed in Figure 5 in the case of ASFRs aggregated over 15 calendar years. Each survey separately shows a substantial decline in the ASFR at 15-19 (the

Table 3 Trends in age-specific birth rates and total fertility rates for the whole country, estimated from the 1991 NFFPHS and the 1996 NFHS

Fertility measure	1991 NFFPHS				1996 NFHS			
	1977 -1981	1982 -1986	1987 -1991	1977 -1991	1981 -1985	1986 -1990	1991 -1995	1981 -1995
ASFRs								
15-19	141	132	97	121	140	143	121	134
20-24	282	283	244	267	271	290	268	276
25-29	289	276	231	263	277	260	230	254
30-34	245	220	176	211	221	208	172	198
35-39	161	156	119	144	146	126	109	126
40-44	82	69	61	70	65	56	41	54
45-49	22	19	15	18	16	11	13	14
TFR	6.11	5.77	4.71	5.47	5.68	5.48	4.77	5.27

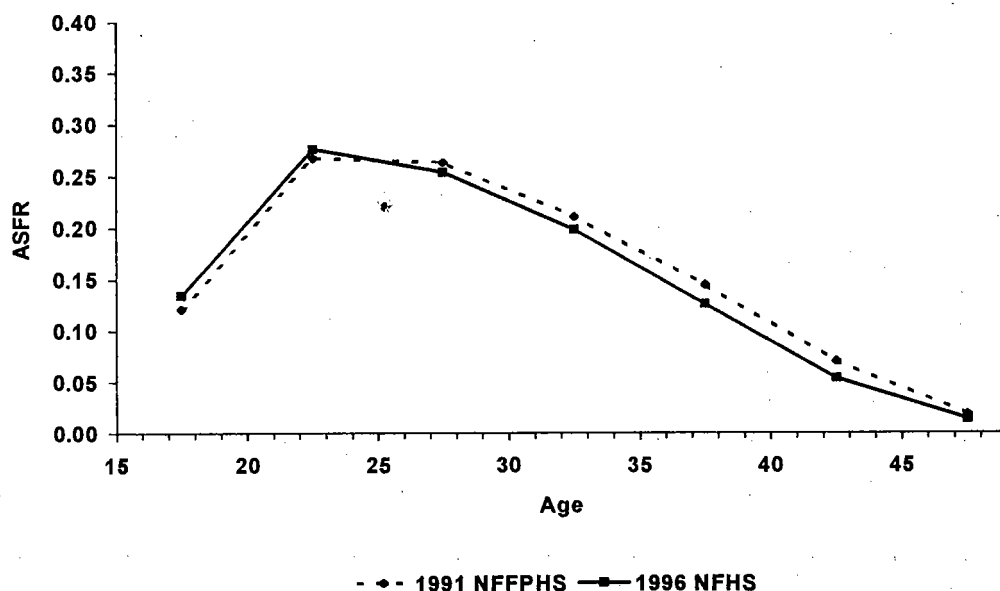
Note: The estimates of TFRs and ASFRs in this table and in all subsequent tables are derived by the own-children method. TFRs are per woman, and ASFRs are per thousand women. The trends over five-year periods, as estimated from each survey separately, are biased and should not be regarded as true trends. See text for explanation.

decline derived from the 1991 NFFPHS is especially steep), but the between-survey estimate of this ASFR, based on 15-year aggregations, increased between the surveys. The same kind of opposite movement is shown to a lesser extent in the estimates of the trend in the ASFR at 20-24. At ages 25-29 and older, the trends in ASFRs are all downward, but the within-survey estimates indicate a much steeper decline than do the

between-survey estimates. And the within-survey estimates of decline derived from the 1991 survey are considerably steeper than the within-survey estimates of decline derived from the 1996 survey.

It is likely that the inconsistencies in Table 3 and Figure 5 result from displacement of births and age misreporting that are worse in the 1991 survey than in the 1996 survey, combined with some real fertility decline at the older reproductive ages. In each survey, the estimated TFR trends clearly indicate some displacement of births from the first five years before the survey to the second five years before the survey, and from the second five years to the third five years before the survey. This displacement of births appears to be considerably greater in the 1991

Figure 5 Age-specific fertility rates for the 15-year period preceding each survey: 1991 NFFPHS and 1996 NFHS



Note: In this figure and all subsequent figures, ASFRs and derived TFRs are estimated by the own-children method.

survey than in the 1996 survey, consistent with the lesser quality of age reporting in the 1991 survey. At the same time, there does not appear to be much displacement from the third five years to the fourth five years before either survey, inasmuch as there is no heaping on age 15 in the 1991 survey and only moderate heaping on age 15 in the 1996 survey, as seen earlier in Figures 1 and 2.

Some of this displacement of births (which, in the case of living children, is equivalent to exaggerating children's ages at the time of the

survey) is due to intentional displacement on the part of interviewers who wish to avoid asking the block of questions asked of young children. But some unintentional displacement in the form of upward rounding of children's ages by survey respondents no doubt also occurs. As already mentioned, the reported number of children age zero (infants below one year of age) is probably fairly accurate in both surveys. However, some children age one year and 11 months may be reported as age 2, and, more generally, some older children about to reach a birthday in one or two months may be reported at the next higher age in completed years, especially by persons who do not remember the exact birth dates and ages of their children. This kind of upward rounding of ages of children effectively displaces their births further into the past.

If respondents do not have accurate knowledge of their ages, there may be an additional type of age misreporting that has the effect of shifting the entire age distribution of fertility (i.e., the graph of ASFRs against age, as in Figure 5) to the right—i.e., to older ages. In this type of age misreporting, there is a net upward bias in reported ages of women who are young but married, and of married women who have a higher than average number of children relative to their true age. There may also be some downward bias in reported ages of older single women and married women who have a lower than average number of children relative to their true age. For example, a young bride might be reported as somewhat older by virtue of her being married, and women who remain unmarried in their early twenties may be reported as younger than their true age because of the anxiety their parents may feel over not having already arranged a suitable match for them. The rightward shift of the age curve of fertility that results from this kind of age misreporting has been observed in India (Narasimhan et al., 1997a, 1997b) and may occur in Nepal as well. It should be noted that shifting the age curve of fertility to the right has little effect on the estimate of the TFR, because ASFRs still add up to approximately the same number of children.

If fertility were constant over time in Nepal (which is not true), then, with this kind of age misreporting, the greater misreporting in the 1991 NFFPHS than in the 1996 NFHS would result in more of a rightward shift of the age curve of fertility derived from the 1991 survey than in the age curve of fertility derived from the 1996 survey, resulting in spurious increases in estimated ASFRs below the peak age of fertility (which in Nepal is around age 25) and excessively large declines in estimated ASFRs above this peak age. It is likely that this mechanism partly explains the pattern of between-survey changes in ASFRs shown

in Figure 5, which, however, also reflects some real fertility decline at ages above 25.

One way to test whether this kind of age misreporting is present is to compare age-specific proportions married in the two surveys. If there is a tendency of young married women to be moved up in age and a tendency of unmarried women to be moved down in age, and if these tendencies are greater in the 1991 survey than in the 1996 survey, then proportions married at the young reproductive ages should be higher in the 1996 survey than in the 1991 survey. Figure 6 shows that this is indeed the case at ages 15-19 but not at higher ages. When proportions married are calculated for five-year age groups, it is found that proportions married in the 1991 and 1996 surveys are 0.33 and 0.43 at 15-19, 0.83 and 0.84 at 20-24, and 0.94 and 0.93 at 25-29. At ages above 30, there is a slight tendency for the proportion calculated from the 1991 survey to exceed the proportion calculated from the 1996 survey. The estimated increase in the proportion married at 15-19 is, of course, implausible, inasmuch as one expects age at marriage to be increasing over time.

Another way to test for this kind of age misreporting is to compare mean parity at each age in the two surveys. If there is a tendency for women with a higher than average number of children relative to their true age to be moved up in age and a tendency of women with a lower than average number of children relative to their true age to be moved down in age, and if these tendencies are greater in the 1991 survey than in the 1996 survey, then mean parity at each age should be higher in the 1996 survey than in the 1991 survey. Figure 7 shows that this is indeed the case at the younger reproductive ages. When mean parities are calculated for five-year age groups, it is found that mean parities in the 1991 and 1996 surveys are 0.15 and 0.23 at 15-19, 1.28 and 1.43 at 20-24, and 2.72 and 2.85 at 25-29. The two mean parities differ little in each higher five-year age group. Thus the comparison of mean parities by age indicates that most of this kind of age misreporting occurs at ages below 30.

Note that the apparent increases in ASFRs at 15-19 and 20-24 in Figure 5 cannot be explained by declining age at marriage, shorter breastfeeding, or improved fecundity due to better nutrition. The median age at first marriage among women age 20-49 hardly changed between the two surveys. Median age at first union was 16.4 in 1991 and median age at first marriage was 16.4 in 1996. The median duration of breastfeeding actually increased slightly between the 1991 and 1996 surveys, from 30.4 to 31.0 months (Ministry of Health, 1993, 1997).

And the period of 4.2 years between the two surveys is much too short for a significant change in average fecundity to have occurred.

Although the ASFR curves in Figure 5, pertaining to 15-year periods, are evidently shifted somewhat to the right because of misreporting of women's ages—more so in the case of the curve derived from the 1991 survey than in the case of the curve derived from the 1996 survey—these curves appear to be less affected by displacement of

Figure 6 Proportion married by single years of age: 1991 NFFPHS and 1996 NFHS

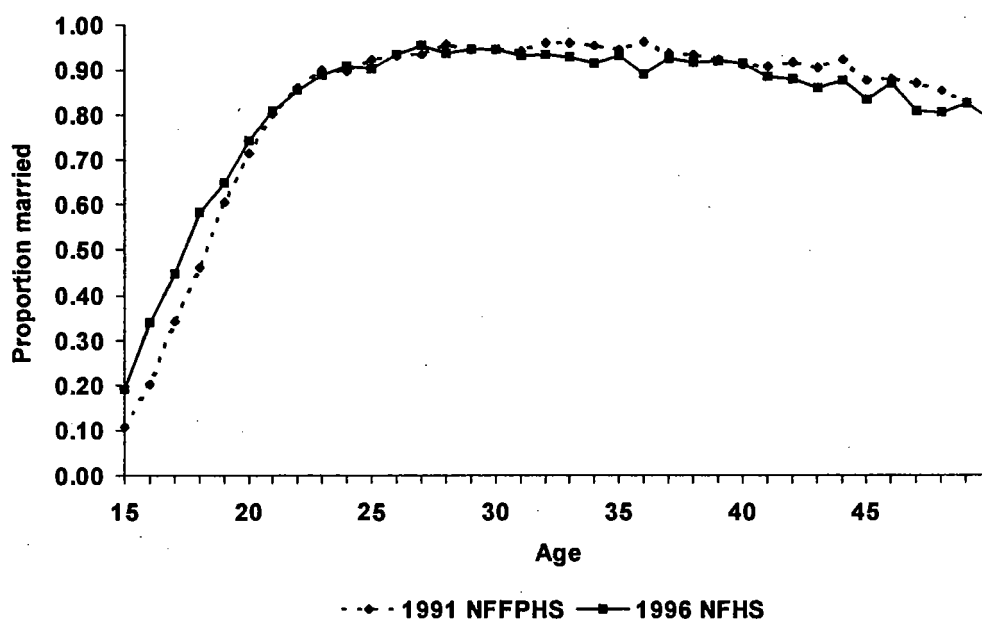
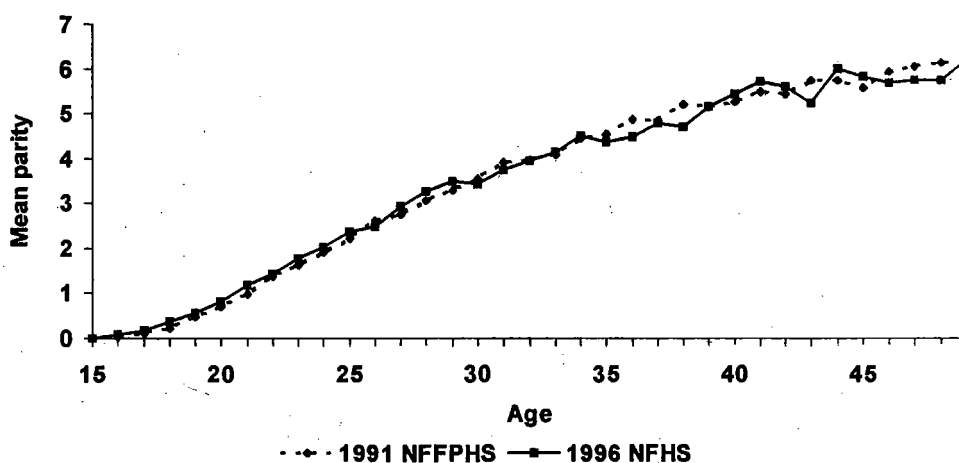


Figure 7 Mean parity by single years of age among all women, regardless of marital status: 1991 NFFPHS and 1996 NFHS



births, which tends to shift the curves to the left. Moreover, since the few births displaced over the time boundary 15 years before the survey are a small proportion of the large number of births that occurred during the following 15 years, displacement across this time boundary, to the extent that it occurs, has a minimal distorting effect on the estimate of the TFR for the 15-year time period.

The above discussion implies that TFRs calculated for 15-year time periods are not appreciably affected either by displacement or by misreporting of women's ages. Therefore, the between-survey estimates of the trend in the TFR based on these 15-year aggregations should be fairly accurate.

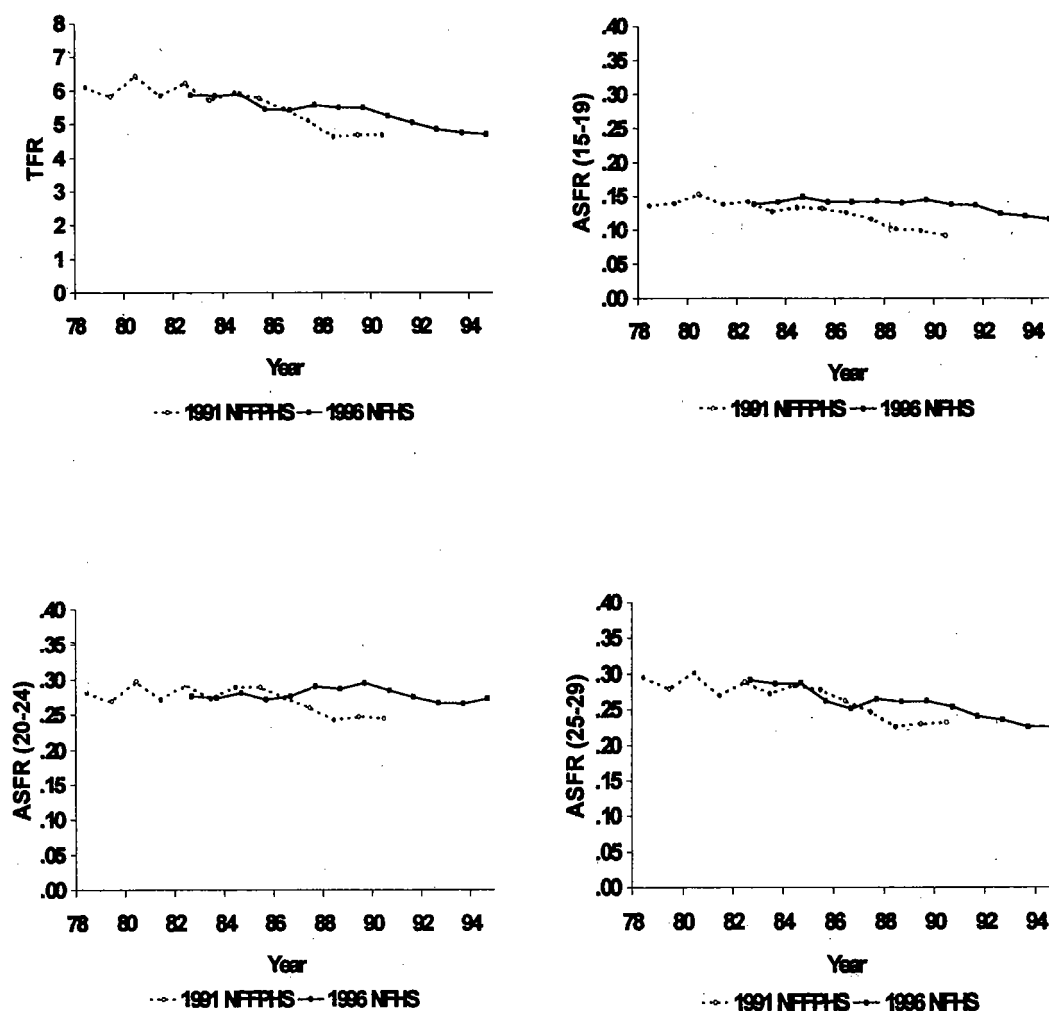
To summarize the above lines of argument, the various types of age misreporting, combined with some real fertility decline, could have resulted in precisely the pattern observed in Table 3 and Figure 5—namely (1) within-survey estimates of TFR decline that are too steep; (2) a between-survey estimate of TFR decline, based on 15-year time aggregations, that may be fairly accurate; (3) within-survey estimates of declines and between-survey estimates of increases in ASFRs at 15-19 and 20-24 that are probably both spurious, inasmuch as these ASFRs probably changed hardly at all between the two surveys; and (4) between-survey estimates of declines in ASFRs at 25-29 and older that are probably too steep because of a rightward shift of the age curves of fertility that is greater for the curve derived from the 1991 survey than for the curve derived from the 1996 survey.

Further light can be shed on the nature of the estimation errors by examining overlapping trends in the TFR and in ASFRs estimated from the two surveys. Figure 8 shows overlapping trends in the TFR and in ASFRs. Plotted points are three-year moving averages of TFRs or ASFRs originally estimated for single calendar years. The pattern of discrepancies during the period of overlap provides clear evidence of displacement of births from the first five years to the second five years before the 1991 survey. The steepness of TFR decline is clearly overestimated by the 1991 survey and probably also by the 1996 survey, though to a lesser extent. These plots provide further support for the argument that the between-survey estimate of the trend in the TFR is more accurate than either of the two within-survey estimates of this trend.

Figure 8 also shows overlapping trends in ASFRs. The overlapping trends coincide rather poorly at ages 15-19, 20-24, 25-29, and 30-34, but rather closely at ages 35-39, 40-44, and 45-49. We suspect that the pattern of misstatement of women's ages, discussed

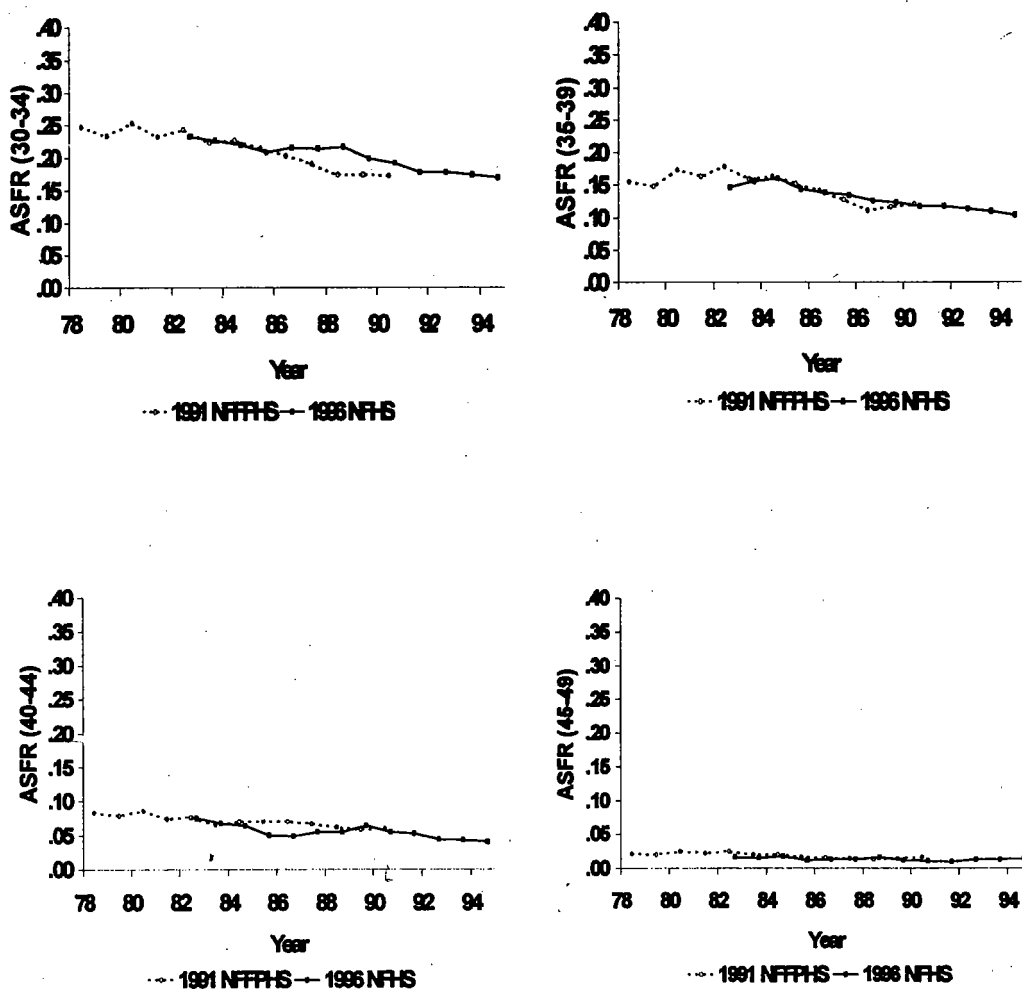
earlier in connection with Figures 6 and 7, provides the main explanation of why the overlap of ASFR trends in Figure 8 is worse at the younger reproductive ages.

Figure 8 Overlapping trends in the TFR and ASFRs, estimated from the 1991 NFFPHS and 1996 NFHS



It is clear from examination of the overlapping trends of ASFRs in Figure 8 that fertility hardly changed at ages 15-19 and 20-24 and declined only modestly at ages 25-29, 30-34, 35-39, and 40-44. This conclusion is similar to that reached in the earlier discussion of Table 3 and Figure 5.

Figure 8 Overlapping trends in the TFR and ASFRs, estimated from the 1991 NFFPHS and 1996 NFHS (continued)



Trends in ASFRs and TFRs by Urban-Rural Residence

Table 4 shows estimates of ASFRs and TFRs for urban and rural areas, aggregated over 15-year time periods, as estimated from the 1991 and 1996 surveys. (Estimates for five-year periods are not shown because they are clearly biased, as seen earlier in the analysis of fertility trends in the country as a whole.) In urban areas, the TFR declined substantially, from 4.30 to 3.88. In rural areas, the TFR declined only slightly, from 5.57 to 5.42.

Table 4 Fertility by residence, estimated for the 15-year period preceding each survey: 1991 NFFPHS and 1996 NFHS

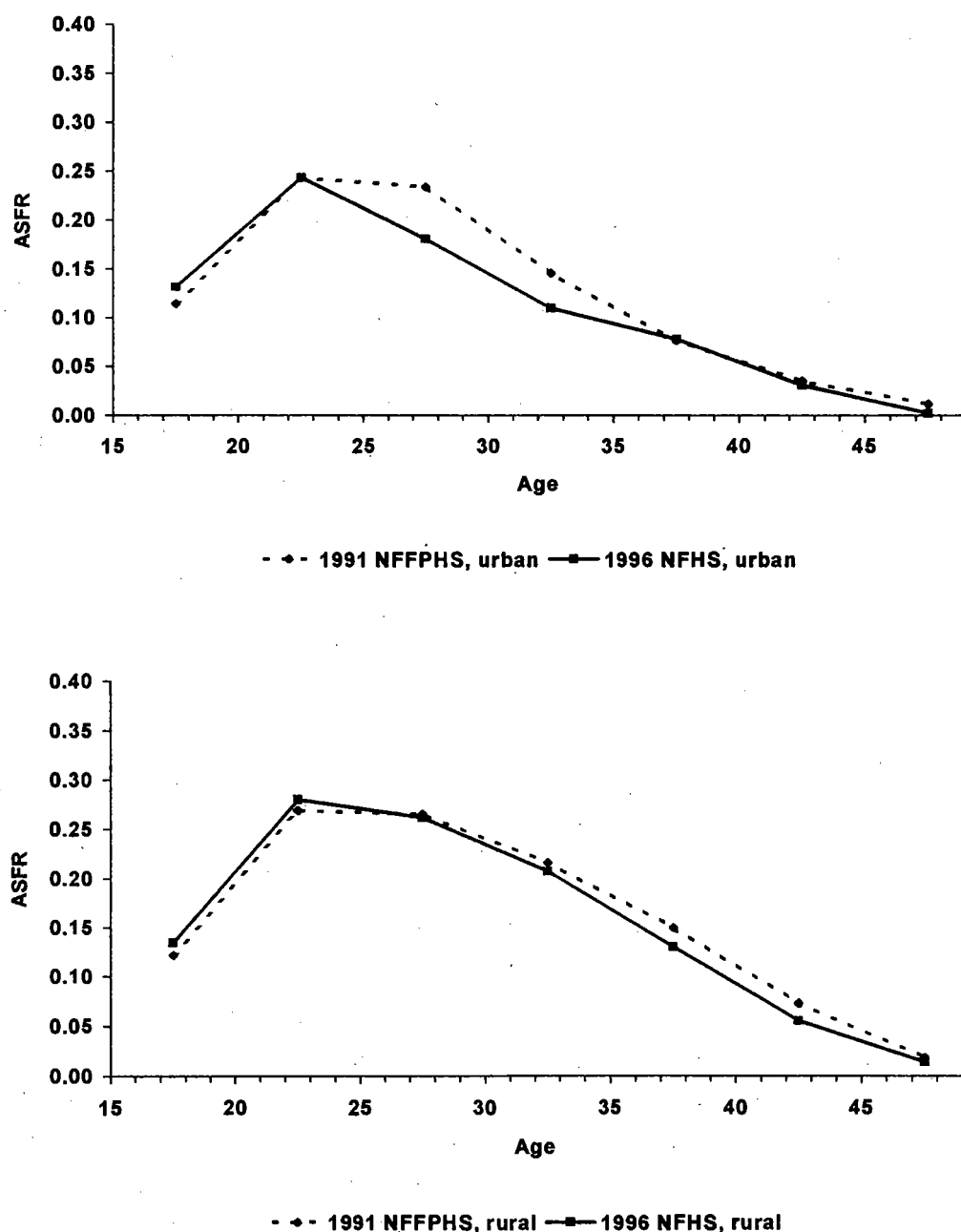
Fertility measure	Urban		Rural	
	1977-91	1981-95	1977-91	1981-95
ASFRs				
15-19	114	132	122	135
20-24	243	243	269	280
25-29	234	181	266	262
30-34	145	110	216	207
35-39	77	78	150	130
40-44	35	31	73	56
45-49	12	2	19	14
TFR	4.30	3.88	5.57	5.42

Note: The estimates for 1977-91 are derived from the 1991 NFFPHS, and the estimates for 1981-95 are derived from the 1996 NFHS. TFRs are per woman, and ASFRs are per thousand women.

Both Table 4 and Figure 9 show trends in ASFRs aggregated over 15-year time periods, by residence. The ASFR at 15-19 rose slightly in both urban and rural areas. This rise is probably spurious, for reasons discussed earlier. The ASFR at 20-24 did not change in urban areas, but it rose slightly in rural areas. ASFRs declined sharply at ages 25-29 and 30-34 in urban areas and modestly at ages 30-34, 35-39, and 40-44 in rural areas. These declines are probably overestimated, for reasons discussed earlier.

Figure 10 elaborates on the findings by residence by showing overlapping trends in TFRs for urban areas and rural areas. There is clear evidence of displacement of births in the 1991 survey in rural areas. The estimated trends for urban areas are unusual in that the rate of fertility decline is about the same in the two overlapping trends, but the trend derived from the 1996 survey is consistently and substantially higher than the trend estimated from the 1991 survey during the period of overlap. Urban-rural migration may partially account for this, inasmuch as the own-children method tabulates fertility estimates in earlier years by residence at the time of the survey, not at the time the births occurred. Many women who were urban at the time of the survey were rural several years ago. This means that the fertility estimates for urban areas are progressively overestimated in earlier years. This kind of bias does not affect the rural estimates because there is very little urban-to-rural migration and because the number of rural-to-urban migrants is

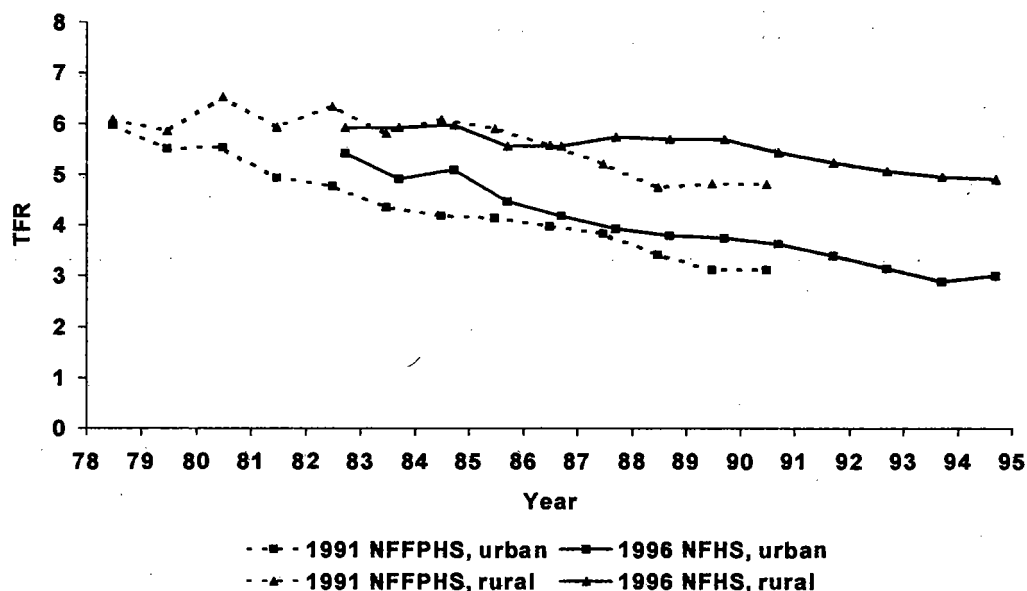
Figure 9 Age-specific fertility rates for the 15-year period preceding each survey, by residence: 1991 NFFPHS and 1996 NFHS



proportionately very small compared with the large rural population but proportionately much larger compared with the small urban population. In sum, rural-urban migration can produce a noticeable upward bias in the fertility estimates for urban areas in earlier years, producing an estimated fertility decline in urban areas that is too steep when this decline is estimated from a single survey. When the trend in the TFR for urban areas

is calculated from the 15-year aggregations, the rate of decline should be accurate, but the level of the trend is probably somewhat too high.

Figure 10 Overlapping trends in the TFR, by urban-rural residence, estimated from the 1991 NFFPHS and the 1996 NFHS



Trends in ASFRs and TFRs by Education

Table 5 shows estimates of ASFRs and TFRs by education, for the categories of no education, at least some primary education, and beyond primary education. The estimates are again aggregated over 15-year time periods preceding the 1991 and 1996 surveys. Among women with no education, the TFR declined slightly, from 5.65 to 5.53. Among women with primary education, the TFR hardly changed, falling very slightly from 4.69 to 4.64. Among women with more than a primary education, the TFR fell more substantially, from 3.26 to 3.03. It should be noted that education has contributed to overall fertility decline not only via fertility declines within education categories but also via a decline in the proportion of women who have no education and increases in the proportions of women who have a primary education or more than a primary education, as seen earlier in Table 2.

Table 5 and Figure 11 show trends in ASFRs aggregated over 15-year time periods, by education. The ASFR at 15-19 rose (probably spuriously, for reasons explained earlier) among women with no education or a primary education but hardly changed among women with more than a

Table 5 Fertility by education, estimated for the 15-year period preceding each survey: 1991 NFFPHS and 1996 NFHS

Fertility measure	No education		Primary		Beyond primary	
	1977-91	1981-95	1977-91	1981-95	1977-91	1981-95
ASFRs						
15-19	131	151	111	132	75	73
20-24	272	282	272	301	216	216
25-29	269	264	236	231	193	164
30-34	219	208	138	137	98	89
35-39	149	131	97	76	56	46
40-44	72	55	57	37	12	13
45-49	18	14	27	13	2	7
TFR	5.65	5.53	4.69	4.64	3.26	3.03

Note: The estimates for 1977-91 are derived from the 1991 NFFPHS, and the estimates for 1981-95 are derived from the 1996 NFHS. TFRs are per woman, and ASFRs are per thousand women.

primary education (probably because of better age reporting in this group). The ASFR at 20-24 remained virtually unchanged among women with no education and women with more than a primary education but increased among women with a primary education (again probably spuriously). At older reproductive ages, fertility fell in all three education groups. Among women with more than a primary education, the decline was concentrated at ages 25-29.

Figure 12 elaborates this picture by showing overlapping trends in TFRs for each of the three education groups. There is clear evidence of displacement of births in the 1991 survey in all three education groups, but less in the beyond-primary group, as expected because of better age reporting in this group. Evidence of fertility decline is clearer for the beyond-primary group than for the other two less-educated groups.

Combining Each Pair of Overlapping Trends into a Single Trend

The analysis of overlapping trends indicates that the 1991 survey suffers from considerable displacement of births from the first five years before the survey to earlier years. There appears to be some displacement of births in the 1996 survey as well, but not nearly as much. On the other hand, the problem of displacement mostly disappears when TFRs are calculated for a 15-year aggregation of calendar years before each survey. The TFRs for 15-year time periods are also affected very little by rightward shifts of the age distribution of fertility. From our analysis, we

have two such TFRs, one pertaining to the 15-year period before the 1991 survey, and the other pertaining to the 15-year period before the 1996 survey.

Figure 11 Age-specific fertility rates for the 15-year period preceding each survey, by education: 1991 NFFPHS and 1996 NFHS

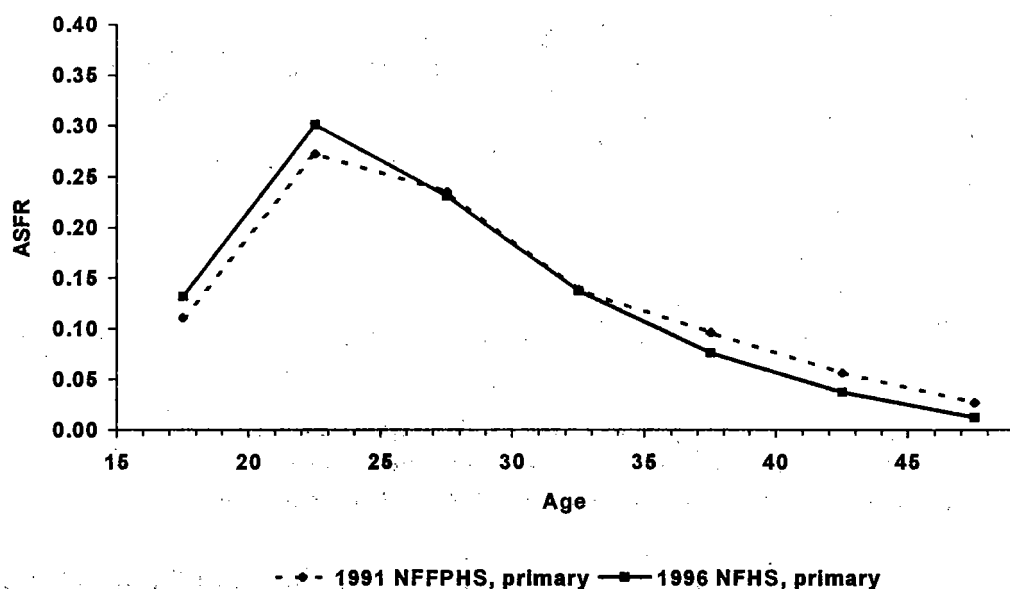
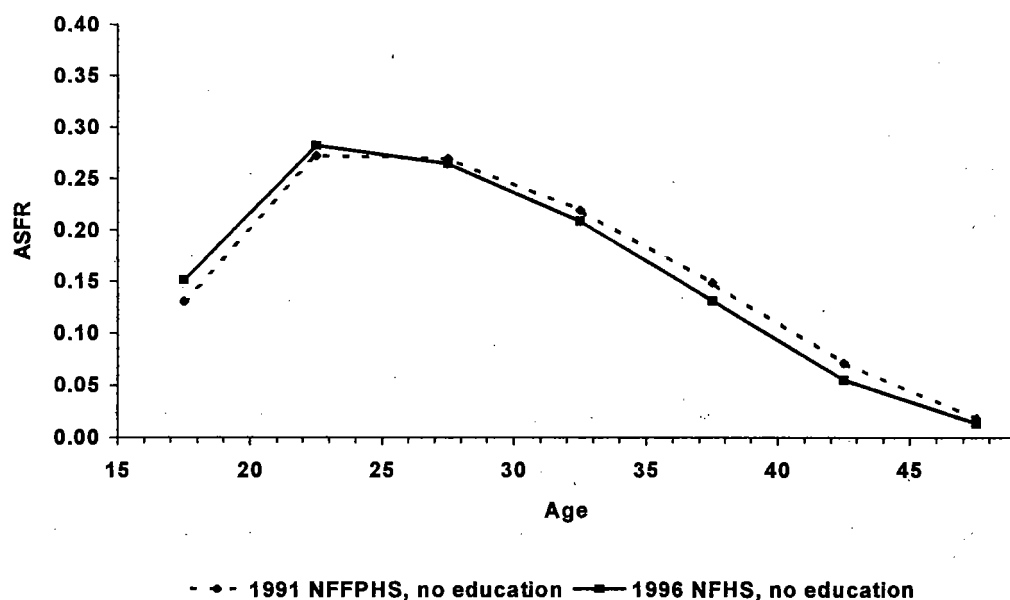


Figure 11 Age-specific fertility rates for the 15-year period preceding each survey, by education: 1991 NFFPHS and 1996 NFHS (continued)

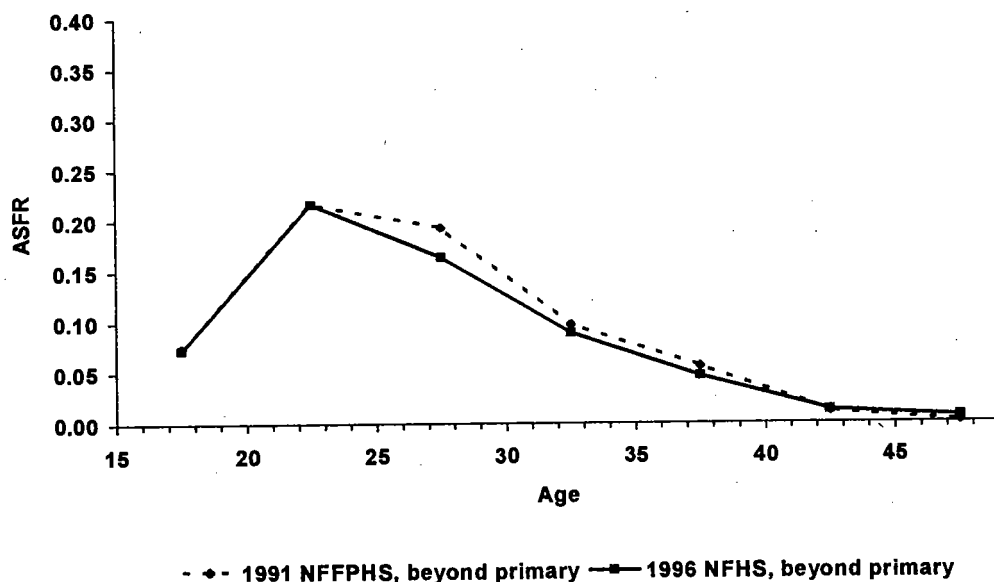
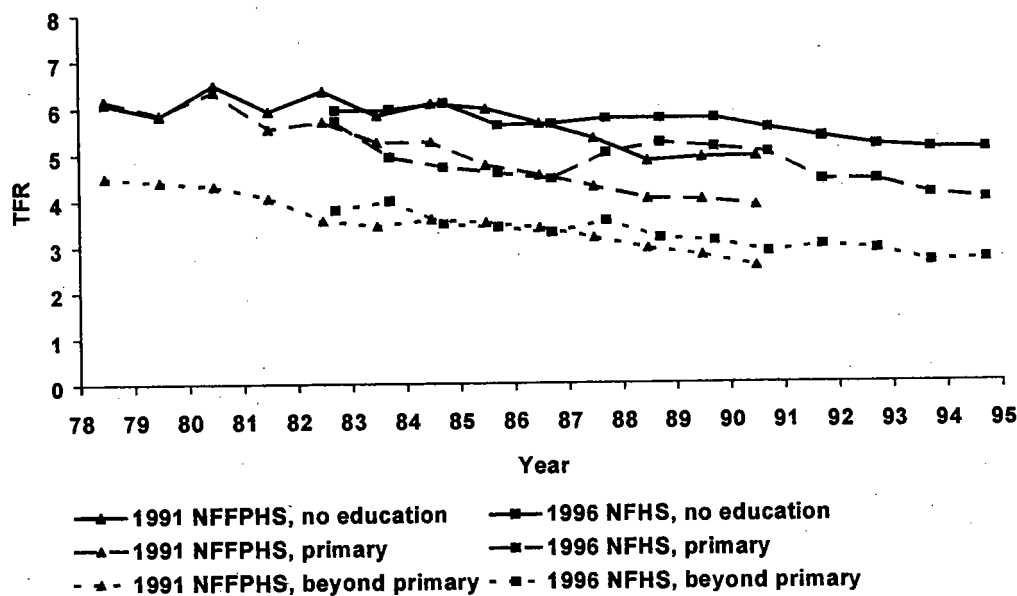


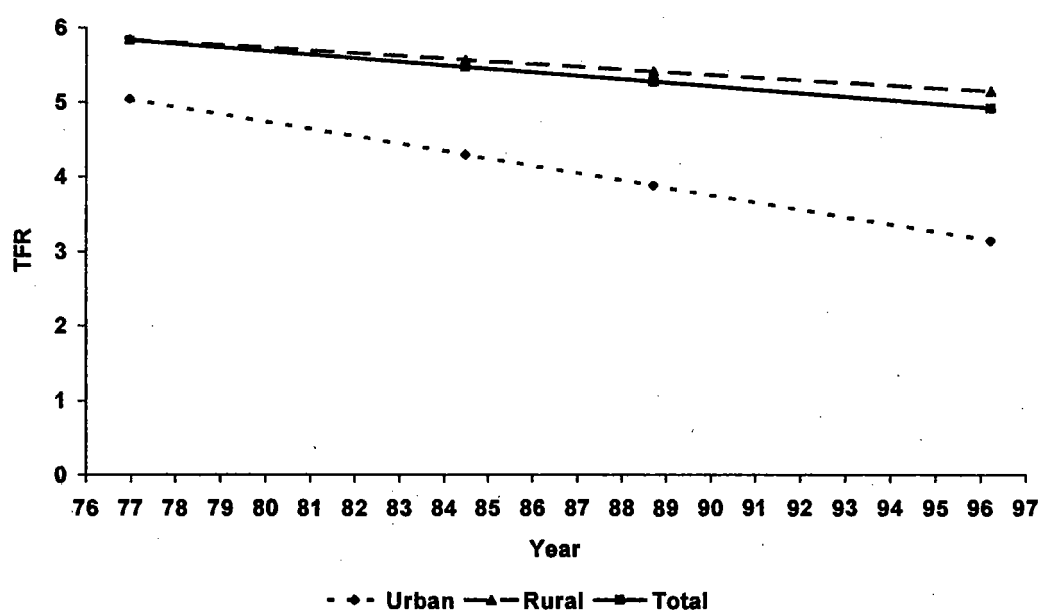
Figure 12 Overlapping trends in the TFR, by education, estimated from the 1991 NFFPHS and the 1996 NFHS



If we consider these TFRs as located at the midpoints of their respective 15-year periods, the two TFRs pertain to 1984.47 and 1988.70. These values are obtained by averaging dates of interview for ever-married

women in each survey and are 4.23 years apart. A simple linear trend in the TFR can be calculated from the 15-year-aggregated TFRs by plotting them on a graph at 1984.47 and 1988.70 and drawing a line through the two points, as in Figure 13, which shows lines obtained in this way for the whole country, urban areas, and rural areas. The lines may be extrapolated back to 1977 and forward to 1995, reflecting the time range of the data on which the two initial TFRs are based. From the equations of the lines, it can be calculated that, between 1977 and 1995, the TFR declined from 5.80 to 4.95 in the country as a whole, from 5.82 to 5.17 in rural areas, and from 4.98 to 3.22 in urban areas. As explained earlier, the rate of decline of the rural TFR should be reasonably accurate, but levels of the urban TFR are probably somewhat too high. Linear trends are not shown for ASFRs, because these trends are severely biased, for reasons discussed earlier.

Figure 13 Linear trends in the TFR, for the whole country and by residence



Notes: Values are calculated from the equations for the straight-line fits. These equations are given in Appendix Table 1. Dots and other symbols on the lines indicate the midpoint of the 15-year period preceding each survey and the end points of the time range of the underlying data on which the estimates are based.

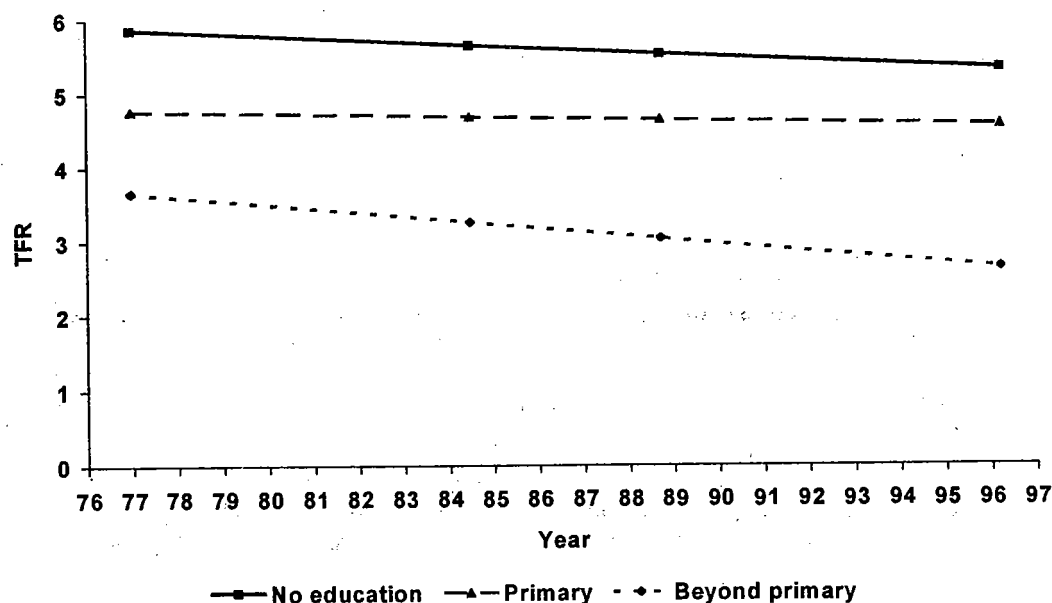
In interpreting these results, it should be borne in mind that fertility did not necessarily decline linearly between 1977 and 1995. This is a simplifying assumption that we have imposed on the data. The fitted lines simply represent estimates of average levels and rates of decline of

fertility over the period 1977-95.

Figure 14 shows similar trend lines for TFRs for education groups. The fitted lines imply that, between 1977 and 1995, the TFR declined from 5.84 to 5.34 among women with no education, from 4.76 to 4.57 among women with at least some primary education, and from 3.63 to 2.67 among women with more than a primary education. Interestingly, fertility appears to have fallen more rapidly among women with no education than among women with at least some primary education. The reasons for this are not clear.

Table 6 summarizes in tabular form the results of the straight-line fits for trends in the TFR for the whole country and by residence and education. Results are presented for 1977 and 1995, again reflecting the time range of the data on which the estimates are based. The equations of the lines on which these estimates are based are given in Appendix Table 1. These simple linear trends are our "best estimates" of the trend in the TFR that we are able to derive from the 1991 and 1996 surveys.

Figure 14 Linear trends in the TFR, by education



Notes: Values are calculated from the equations for the straight-line fits. These equations are given in Appendix Table 1. Dots and other symbols on the lines indicate the midpoint of the 15-year period preceding each survey and the end points of the time range of the underlying data on which the estimates are based.

Table 6 Linear trend estimates of TFRs for the whole country, by residence, and by education

Characteristic	1977	1995
Total	5.80	4.95
Residence		
Urban	4.98	3.22
Rural	5.82	5.17
Education		
No education	5.84	5.34
Primary	4.76	4.57
Beyond primary	3.63	2.67

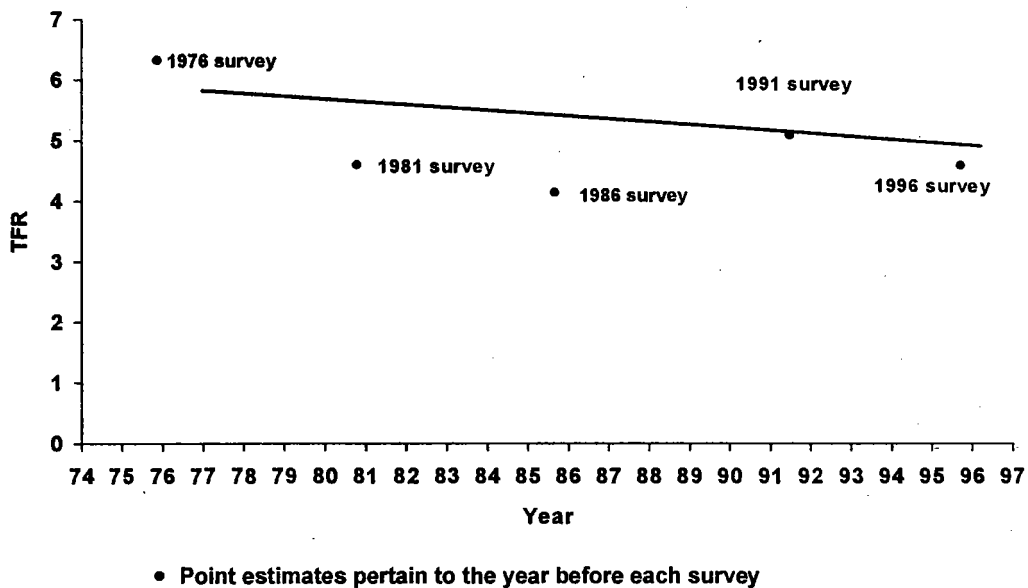
Note: TFRs are per woman. Values for 1977 and 1995 are calculated by substituting 77.5 and 95.5 into equations for the straight-line fits. These equations are given in Appendix Table 1.

Comparing with Fertility Trends Derived from Other Sources

Figure 15 compares the linear trend in the TFR estimated from 15-year-aggregated estimates from the 1991 NFFPHS and the 1996 NFHS with TFR estimates from three other surveys: the 1976 Nepal Fertility Survey, the 1981 Nepal Contraceptive Prevalence Survey, and the 1986 Fertility and Family Planning Survey. Each of the five point estimates of the TFR shown in the graph pertains to the year before the survey from which the point estimate was derived. The year before the survey is used because births in the year before the survey correspond to children below age one at the time of the survey, whose age is thought to be reported more accurately than the ages of older children. The TFR point estimates derived from the surveys of 1976, 1991, and 1996 are all fairly close to the linear trend line derived from the 1991 and 1996 surveys. However, the TFR point estimates derived from the 1981 and 1986 surveys both fall well below the linear trend line. It is generally thought that data quality is not nearly as good in the 1981 and 1986 surveys as in the 1976, 1991, and 1996 surveys.

The linear trend line suggests that fertility has been falling somewhat more slowly than indicated by the point estimates from the 1976 and 1996 surveys, which are thought to be the two surveys with the highest data quality.

Figure 15 Comparison of the linear trend in the TFR estimated from the 1991 NFFPHS and the 1996 NFHS with estimates from other sources



Trends in PPPRs, TFR_p and $TMFR_p$

Period parity progression ratios (PPPRs) can be derived from both the 1991 NFFPHS and the 1996 NFHS. PPPRs are useful because they directly describe the family-building process. In this respect they are also useful for evaluating the performance of family planning programmes. For example, if the slogan of the family planning programme is “stop at three,” the trend in p_3 provides a means of measuring directly how well the program is doing.

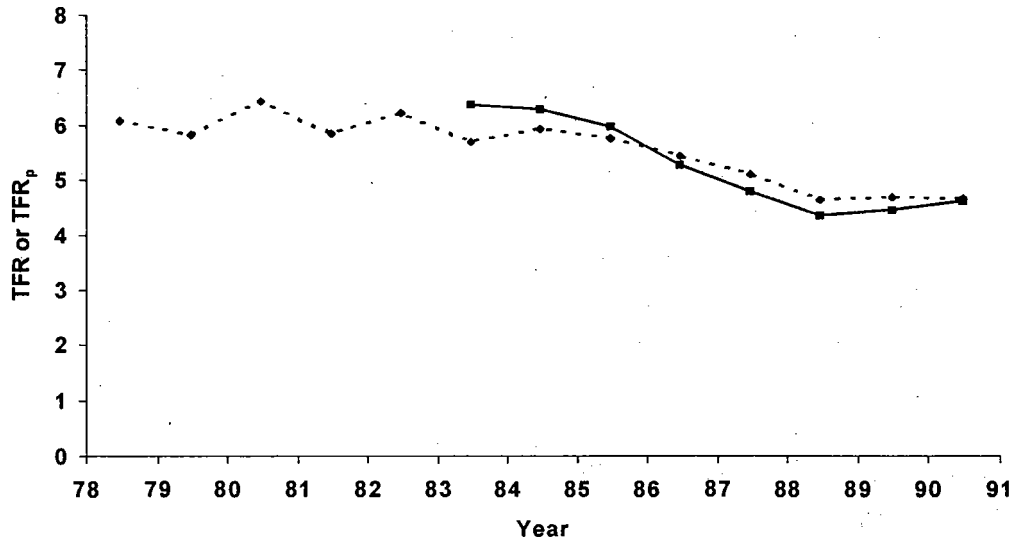
As discussed earlier, it is possible to calculate a total fertility rate, TFR_p , and a total marital fertility rate, $TMFR_p$, from a set of PPPRs. We first look at how well the trend in TFR_p agrees with the trend in TFR, where TFR denotes the conventional age-based total fertility rate discussed earlier. This comparison is shown in Figure 16. In this figure, the values of TFR_p are calculated for overlapping three-year time periods and are plotted at the midpoints of those time periods. (This is a slightly different procedure than that used in the age-based analysis, where we have calculated three-year moving averages of estimates of TFRs for single calendar years.) Figure 16 shows that the trend in TFR_p agrees quite well with the trend in TFR. The agreement is better for trends estimated from the 1996 survey than for the trends estimated from the 1991 survey. As discussed earlier in the section on methodology, one does not expect the two trends to coincide precisely.

Figure 17 shows overlapping trends in TFR_p and in $TMFR_p$, as estimated from the 1991 and 1996 surveys. As in the earlier analysis of TFR trends, the overlaps indicate considerable displacement of births in the 1991 survey.

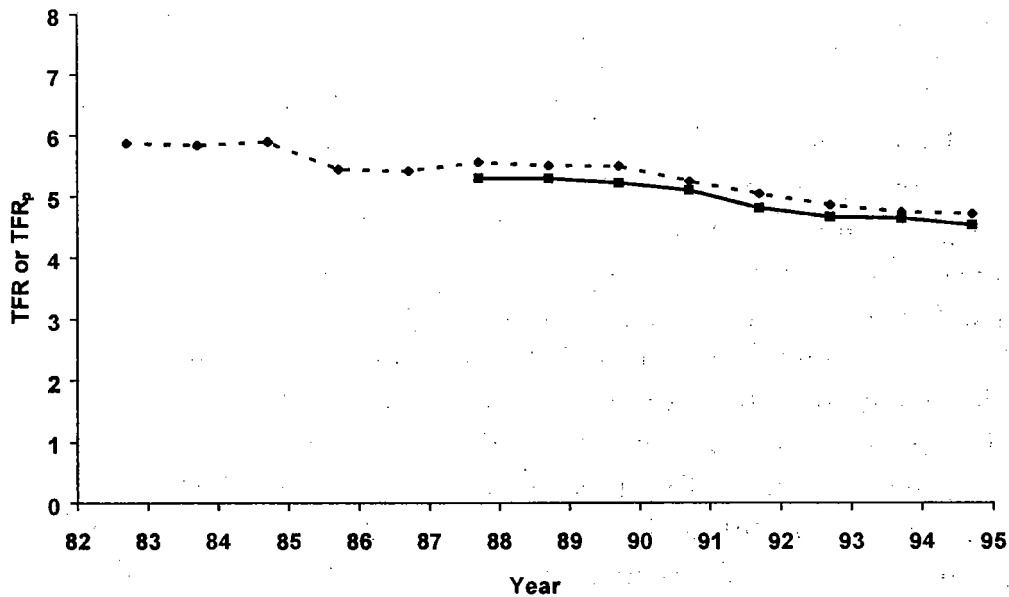
Figure 18 shows overlapping trends in PPPRs, starting with $B \rightarrow M$ (birth to marriage) and ending with $7+ \rightarrow 8+$ (parity 7 or more to next birth). Over the entire estimation period, the progression ratio from birth to marriage, p_B , decreased somewhat, but was still very high at about 95 percent at the end of the estimation period. p_M increased slightly, and in this case the two curves coincide almost perfectly during the period of overlap. p_1 also increased slightly; in this case, discrepancies during the period of overlap are more noticeable but still small. p_2 declines over time, and discrepancies during the period of overlap are larger. p_3 also declines, and discrepancies during the period of overlap are slightly smaller than in the case of p_2 . The progression ratios p_4 , p_5 , p_6 , and p_{7+} show steeper declines, and discrepancies during the period of overlap are quite large.

In Figure 18, the overlap is worse the higher the starting parity. There appear to be two reasons for this: (1) greater displacement of births among higher parity women, and (2) a greater tendency to overestimate the steepness of PPPR decline at higher parities because of the age truncation bias discussed earlier. Because of the reverse-J-shaped pattern that is increasingly evident at higher parities in the PPPR trends derived from the 1991 survey, we suspect that greater displacement of births is the more serious problem. We argued earlier that infants were probably enumerated fairly accurately in both surveys, implying little displacement of births from the first year before the survey to the second year before the survey. We also argued that some children age one year and eleven months are rounded up to age two, implying some displacement of births from the second year before the survey to the third year before the survey. But children age one were born recently enough that women still remember their date of birth fairly accurately, so that the amount of such displacement is probably modest. Upward rounding may be considerably more common at age two than age one, in which case the net deficit of births in the third year before the survey (calculated as births displaced out to age three minus births displaced in from age one) might be particularly large. This net deficit may become smaller at progressively higher ages of children, as outgoing and incoming displaced births come into approximate balance.

Figure 16 Comparison of the trend in the total fertility rate calculated from age-specific fertility rates (TFR) with the trend in the total fertility rate calculated from period parity progression ratios (TFR_p): 1991 NFFPHS and 1996 NFHS



---♦--- TFR estimated from the 1991 NFFPHS —■— TFR_p estimated from the 1991 NFFPHS



---♦--- TFR estimated from the 1996 NFHS —■— TFR_p estimated from the 1996 NFHS

Figure 17 Overlapping trends in TFR_p and in $TMFR_p$, estimated from the 1991 NFFPHS and the 1996 NFHS

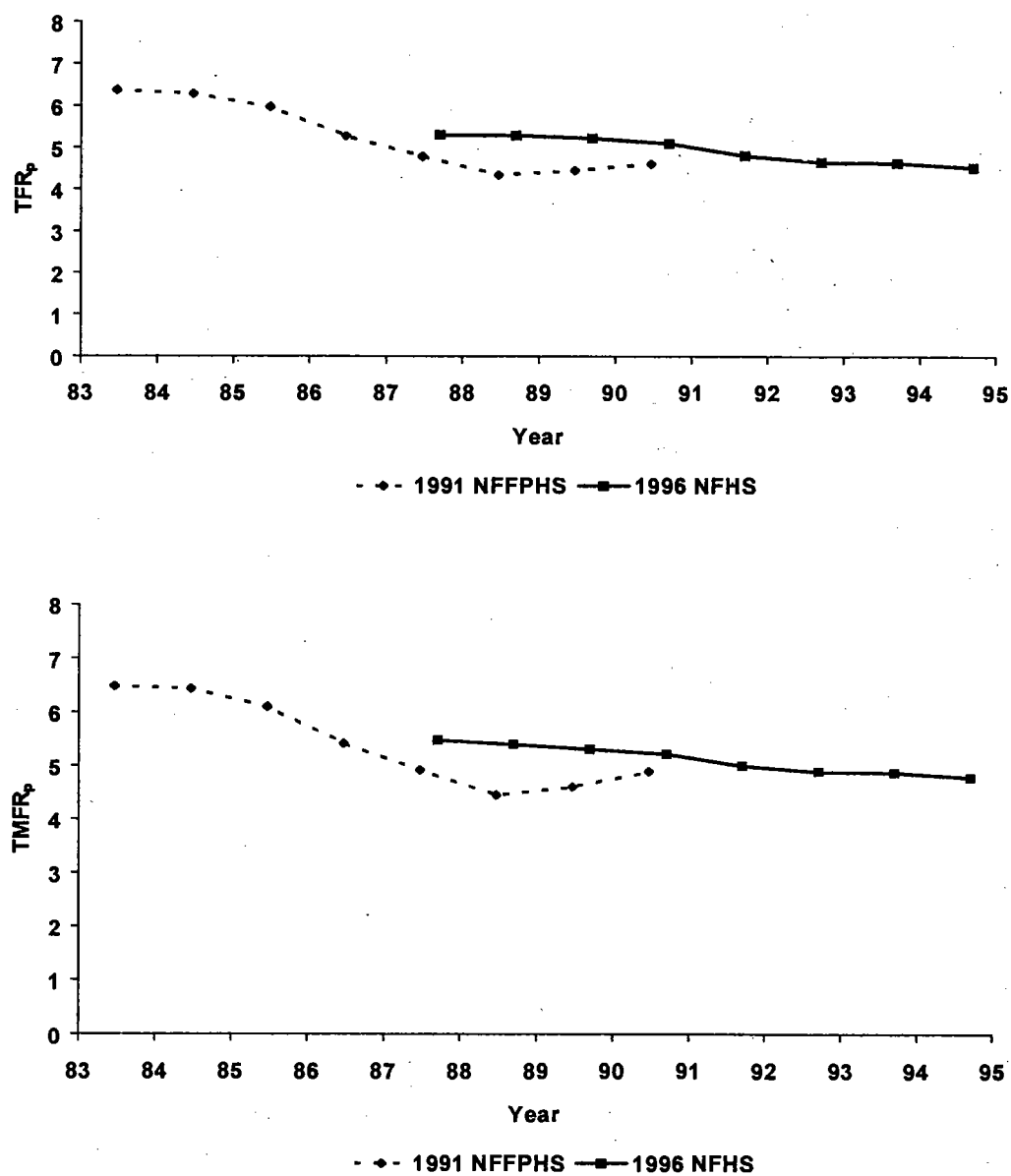


Figure 18 Overlapping trends in PPPRs, estimated from the 1991 NFFPHS and the 1996 NFHS

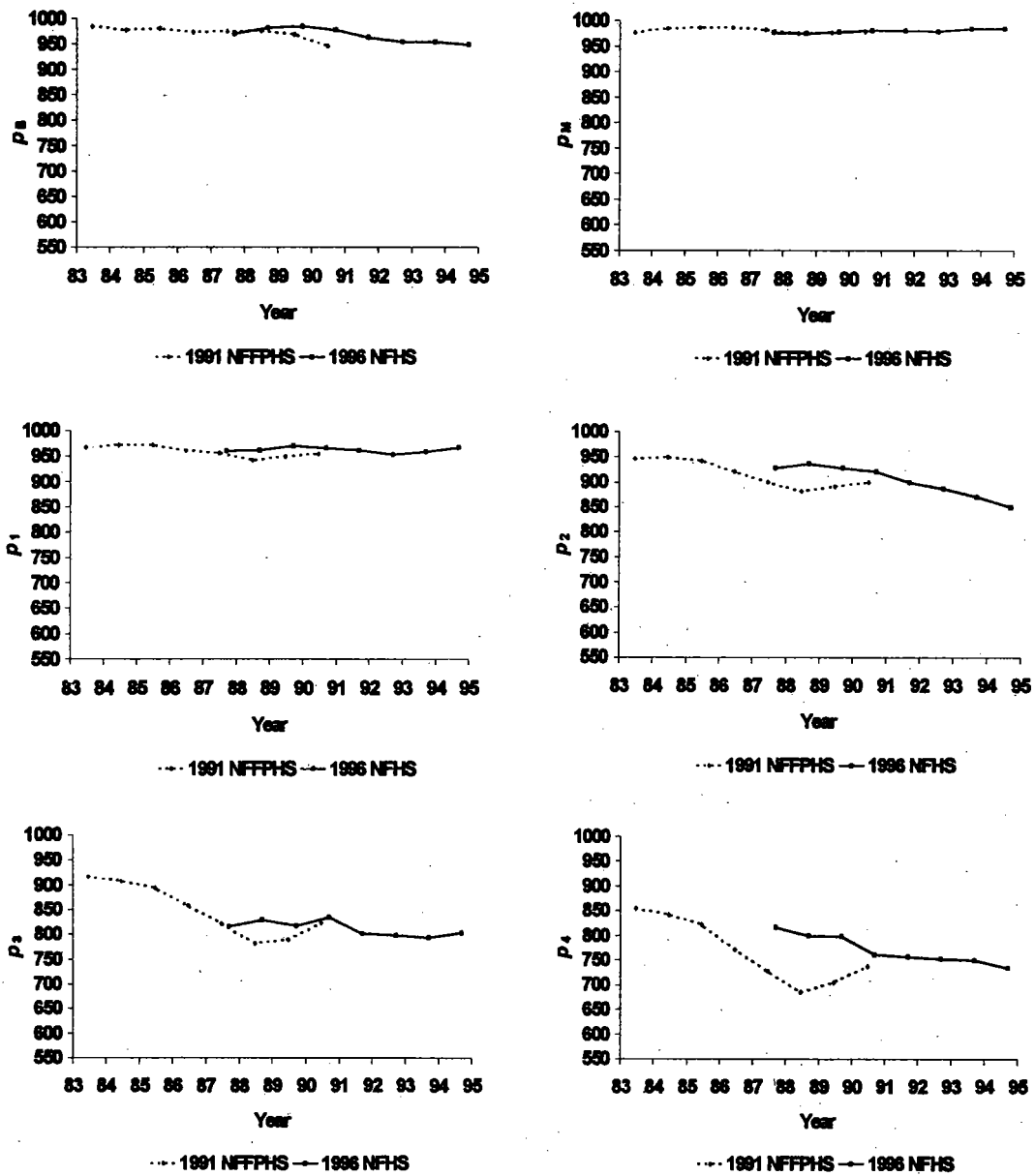
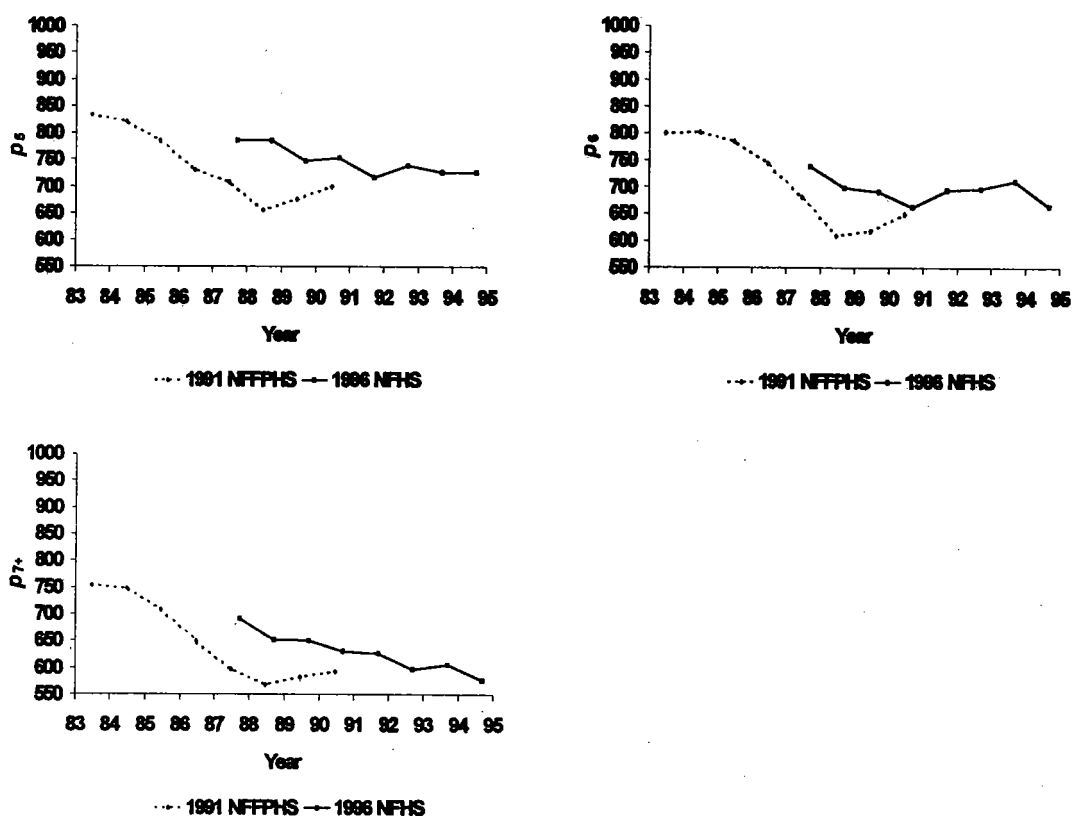


Figure 18 Overlapping trends of PPPRs, estimated from the 1991 NFFPHS and the 1996 NFHS (continued)



If this is what is really happening, we would expect to see the reverse-J-shaped trend that is observed in the estimates derived from the 1991 survey. Because the reversed-J shape is so pronounced in the trends in p_3 , p_4 , p_5 , p_6 , and p_{7+} , we conclude that there was considerable displacement of births to women of parity 3 or higher. The other reason why we think displacement is a more serious problem than the bias from age truncation is that the PPPR trends at higher parities estimated from the 1996 survey are not steeply downward, except for the steeply downward trend in p_{7+} , which might even be mostly real.

Table 7 provides additional information with which to test of the hypothesis that births in the year before the survey tend to be displaced backward in time to a much lesser extent than births that occurred in earlier years. If the hypothesis is true, then one expects the interval between next-to-last and last birth to be longer if the last birth occurred in the year before the survey than if the last birth occurred in an earlier year. The unadjusted mean birth intervals in the left half of Table 7 provide some support for this expectation, but these unadjusted results

are somewhat inconclusive because they lack a control for mother's age at the time of the survey. Such a control is needed, because mothers whose last birth occurred more than one year before the survey tend to be older than mothers whose last birth occurred in the year before the survey, and because older mothers tend to have longer birth intervals.

The adjusted values in the right half of Table 7 control for mother's age at the time of the survey by means of multiple regression. At any given parity, the interval between next-to-last and last birth is first regressed on two predictor variables: mother's age at the time of the survey and a dummy variable indicating whether the last birth occurred in the year before the survey. The fitted regression equation is then used to predict two values of mean birth interval (one value for mothers who had their last birth during the year before the survey, and the other value for mothers who had their last birth in an earlier year) by substituting in the mean value of mother's age at the time of the survey while setting the dummy variable alternatively to one or zero. Mother's age at the time of the survey is thus controlled by holding it constant at its mean value for mothers of the specified parity. This procedure is repeated at other parities, yielding the adjusted values shown. The adjusted values of mean last birth interval are considerably and consistently longer for mothers whose last birth occurred during the year before the survey,

Table 7 Mean interval between next-to-last and last birth (in months), by parity

Parity	Unadjusted				Adjusted for mother's age at the time of the survey			
	1991 NFFPHS		1996 NFHS		1991 NFFPHS		1996 NFHS	
	Had		Had		Had		Had	
	last	Had	last	Had	last	Had	last	Had
	birth	Last	birth	last	birth	last	birth	last
	during	Birth	during	birth	during	birth	during	birth
	year	During	year	during	year	during	year	during
	before	Earlier	before	earlier	before	earlier	before	earlier
	survey	Year	survey	year	survey	year	survey	year
2	37.2	38.2	36.4	38.2	42.3	36.3	42.7	36.1
3	38.0	39.0	35.1	37.7	42.5	37.6	40.3	36.4
4	40.4	37.4	40.0	37.6	44.7	36.4	45.1	36.3
5	41.7	38.1	35.6	36.5	45.3	37.2	39.2	35.7
6+	41.7	36.5	38.3	35.9	44.2	36.0	41.0	35.5

Note: Women whose last birth was a multiple birth are omitted from this table. Multiple regression was used to control for mother's age at the time of the survey, as explained in the text.

consistent with the hypothesis that births in the year before the survey are displaced backward in time to a much lesser extent than births occurring in earlier years. The results also indicate that, while there is considerable backward displacement of births in both surveys, there tends to be more displacement in the 1991 survey than in the 1996 survey.

Interestingly, the reverse-J-shaped trends that are commonly associated with displacement, so marked in the 1991 survey, are mostly lacking in the 1996 survey (Figure 18), even though there is considerable displacement of births also in the 1996 survey, as indicated by Table 7. It may be that interviewers in the 1996 survey, but not in the 1991 survey, were trained to watch out for unusually long birth intervals and to spread births evenly over time when in doubt about precise birth dates. In that case, one would not expect to see reverse-J-shaped trends derived from the 1996 survey, despite the presence of displacement.

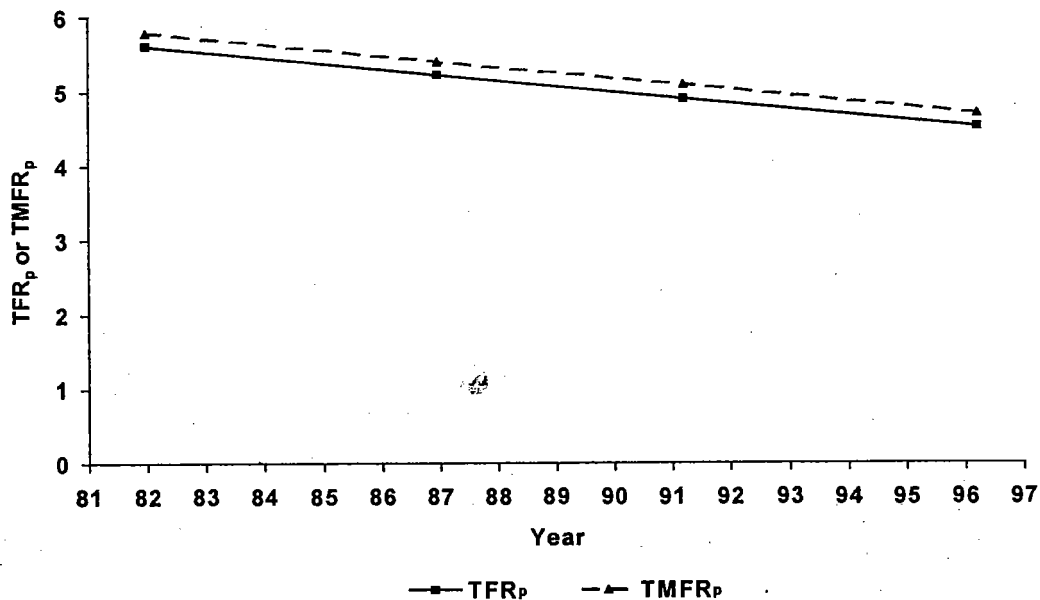
Because of the bias from displacement, we again consider it prudent to base our "best estimates" of trends in $PPPR_s$, TFR_p , and $TMFR_p$ on aggregated data for broad time periods, in this case the 10-year time period preceding each of the two surveys. These estimates for broad periods can be used to derive straight-line trends. The approach used to derive these straight-line trends is similar to that used earlier to estimate straight-line trends in the TFR_s , except that the base data are for 10-year time periods instead of 15-year time periods preceding each survey. We obtain one such estimate (TFR_p , $TMFR_p$, or $PPPR$) from each survey, plot the two points at the midpoints of the two 10-year time periods, and fit a line through the two points to estimate a simple linear trend extending from 1982-1995, reflecting the time range of the underlying data. Results are shown in Figures 19-22 and Tables 8 and 9. The equations for the straight-line fits are given in Appendix Tables 2 and 3.

Figure 19 shows that TFR_p and $TMFR_p$ declined at the same rate in the country as a whole, reflecting the fact that the $PPPR$ from birth to marriage hardly changed between the two surveys, as shown in Figure 20. Figure 20 also shows that $PPPR_s$ for transitions $M \rightarrow 1$ and $1 \rightarrow 2$ also hardly changed. p_2 declined, and p_3 declined considerably more—in fact more rapidly than any other $PPPR$. The progression ratios p_4 and p_5 hardly changed. The progression ratios p_6 and p_{7+} also declined, but somewhat less rapidly than p_3 .

Figure 21 indicates that TFR_p declined at about the same rate in urban and rural areas. However, $TMFR_p$ declined considerably faster in urban than in rural areas, as shown in Table 9. The inconsistency

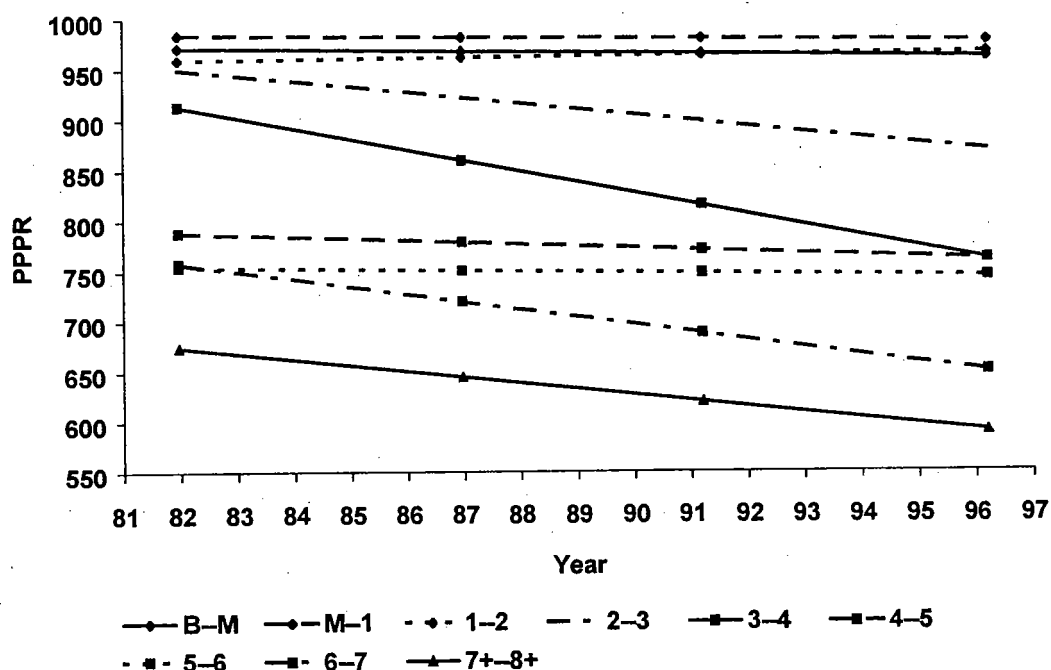
between these two trends stems from an exceptionally low urban value of p_B estimated from the 1991 survey, which produces an exceptionally low urban estimate of p_B in 1982 (not shown), possibly reflecting a quirk in the 1991 sample. The resulting sharp and probably spurious rise in the urban estimate of p_B may explain why TFR_p does not fall more rapidly in urban areas than in rural areas (Figure 21), whereas TFR , calculated from ASFRs, does fall more rapidly in urban than in rural areas (Figure 13). By education, TFR_p declined slightly faster among those with more than a primary education than among those with either no education or primary education (Figure 22).

Figure 19 Linear trends in TFR_p and $TMFR_p$

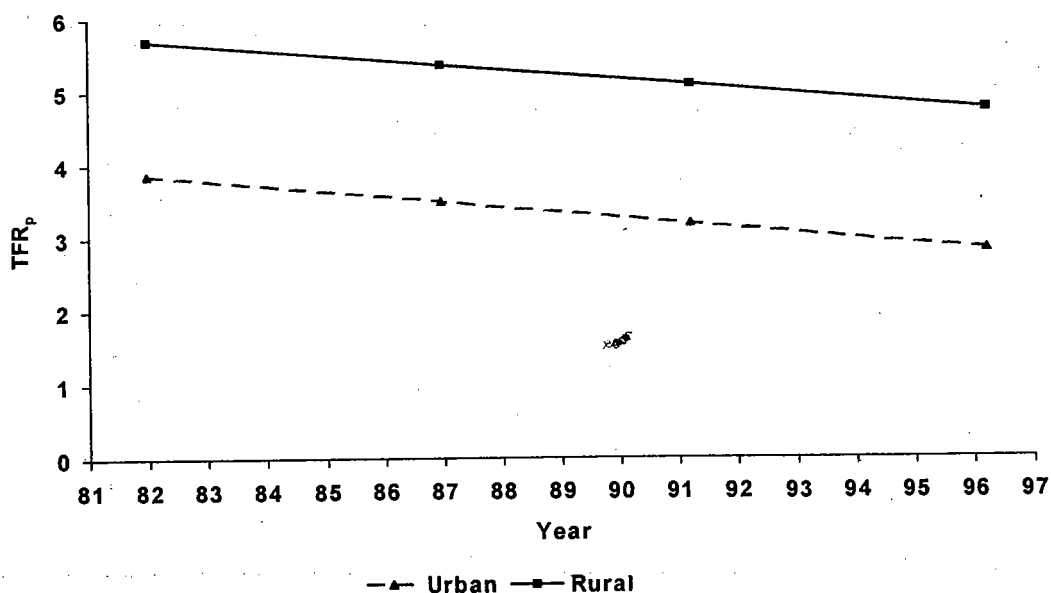


Notes: Values are calculated from the equations for the straight-line fits. These equations are given in Appendix Table 2. Dots and other symbols on the lines indicate the midpoint of the 10-year period preceding each survey and the end points of the time range of the underlying data on which the estimates are based.

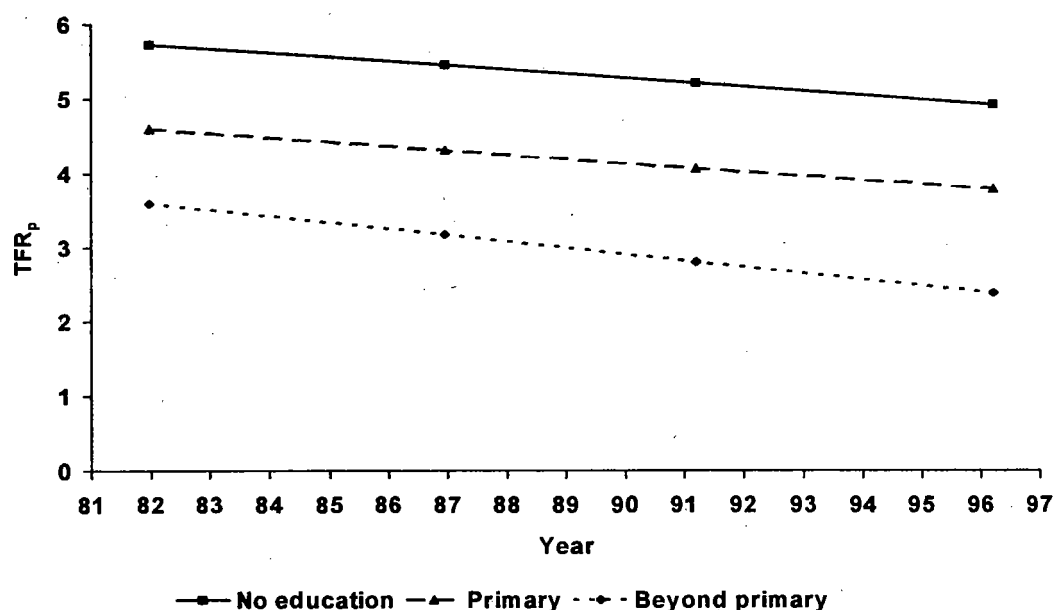
Figure 20 Linear trends in PPPRs



Notes: Values are calculated from the equations for the straight-line fits. These equations are given in Appendix Table 2. Dots and other symbols on the lines indicate the midpoint of the 10-year period preceding each survey and the end points of the time range of the underlying data on which the estimates are based.

Figure 21 Linear trends in TFR_p by residence

Notes: Values are calculated from the equations for the straight-line fits. These equations are given in Appendix Table 3. Dots and other symbols on the lines indicate the midpoint of the 10-year period preceding each survey and the end points of the time range of the underlying data on which the estimates are based.

Figure 22 Linear trends in TFR_p by education

Notes: Values are calculated from the equations for the straight-line fits. These equations are given in Appendix Table 3. Dots and other symbols on the lines indicate the midpoint of the 10-year period preceding each survey and the end points of the time range of the underlying data on which the estimates are based.

Table 8 Linear trend estimates of PPPRs, TFR_p , and $TMFR_p$ for the whole country

Fertility measure	1982	1995
PPPRs		
B→M	971	962
M→1	984	978
1→2	960	966
2→3	947	874
3→4	908	769
4→5	787	763
5→6	754	745
6→7	754	655
7+→8+	671	595
TFR_p	5.57	4.58
$TMFR_p$	5.75	4.76

Note: TFR_p and $TMFR_p$ are per woman, and PPPRs are per thousand women. Values for 1982 and 1995 are calculated by substituting 82.5 and 95.5 into the equations for the straight-line fits. These equations are given in Appendix Table 2.

Table 9 Linear trend estimates of TFR_p and $TMFR_p$ for the whole country by residence and by education

Characteristic	TFR_p		$TMFR_p$	
	1982	1995	1982	1995
Residence				
Urban	3.82	2.90	4.61	2.89
Rural	5.67	4.81	5.80	5.01
Education				
No education	5.70	4.97	5.84	5.05
Primary	4.56	3.83	4.89	3.81
Beyond primary	3.55	2.44	3.83	2.72

Note: TFR_p and $TMFR_p$ are per woman. Values for 1982 and 1995 are calculated by substituting 82.5 and 95.5 into the equations for the straight-line fits. These equations are given in Appendix Table 3.

Conclusion

The analysis in this study shows that fertility trends estimated separately from the 1991 Nepal Fertility, Family Planning and Health Survey and the 1996 Nepal Family Health Survey suffer from various distortions due to errors in the data. These distortions have much to do with the quality of age reporting, both for women and for children. Ages are reported much more accurately in the 1996 survey than in the 1991 survey. In both surveys, but much more so in the 1991 survey, children tend to be reported as older than they really are. Reflecting this, the 1991 survey shows evidence of considerable displacement of births to earlier years, whereas the 1996 survey shows less displacement. As a consequence, the decline in the total fertility rate estimated from the 1991 survey is much steeper than the fertility decline estimated from the 1996 survey.

The nature of the distortion of women's ages appears to be that women who are young and married tend to be reported as older than they really are by virtue of their being married, and women who have a higher than average number of children relative to their true age tend to be reported as older than they really are. It also appears that young single women tend to be reported as younger than they really are, and women with a smaller than average number of children relative to their true age tend to be reported as younger than they really are. The net result of this misreporting of women's ages is to shift the age curve of fertility (ASFRs plotted against age) to the right. Because misreporting of women's ages is more severe in the 1991 survey than in the 1996

survey, this spurious shifting of the age curve of fertility to the right is more evident in the 1991 survey than in the 1996 survey. As a result, trends in ASFRs derived by comparing ASFRs from the 1991 survey with ASFRs from the 1996 survey are severely distorted.

To neutralize the effects of displacement and age misreporting, fertility is estimated for the entire 15-year period before each survey. The aggregation over fifteen years eliminates for the most part the effect of displacement on the estimates of the total fertility rate, because fifteen years of births correspond to children age 0-14 at the time of the survey, implying that misreporting of children's ages within this age group has virtually no effect on the estimated number of births during the previous fifteen years. Displacement can only occur if children are moved across the age boundary at age 15. The fact that there is not much heaping on age 15 in either survey suggests that the net number of children who are erroneously moved across this age boundary is small. Moreover, the number of such children is quite small as a proportion of the total number of children age 0-14.

But misreporting of women's ages distorts ASFRs even when they are calculated for the entire 15-year period. The age curve of fertility is still shifted to the right. Because there is not much fertility after age 40, and very little after age 45, the shift to the right has very little effect on the estimates of the total fertility rate, inasmuch as ASFRs still add up to approximately the same number. Therefore, our estimates of the total fertility rate for the 15-year period preceding each survey are affected very little by either displacement or misreporting of women's ages, and we consider that these estimates of the TFR are reasonably accurate.

By plotting the estimates of the total fertility rate for the two 15-year time periods at the midpoints of those time periods and drawing a line between the two points, we obtain a reasonably accurate estimate of the trend in the total fertility rate over time. The trends so obtained suggest that current fertility is somewhat higher than commonly thought, and that fertility has been declining somewhat more slowly than commonly thought. Our best estimates indicate that, between 1977 and 1995, the TFR declined from 5.80 to 4.95 in the country as a whole, from 5.82 to 5.17 in rural areas, and from 4.98 to 3.22 in urban areas. By education, the TFR declined from 5.84 to 5.34 among women with no education, from 4.76 to 4.57 among women with at least some primary education, and from 3.63 to 2.67 among women with more than a primary education.

The total fertility rate can be calculated not only from ASFRs (TFR) but also from parity progression ratios (TFR_p). The trend in total fertility is about the same, regardless of whether TFR or TFR_p is used as the measure of total fertility. By residence, however, the TFR measure indicates that total fertility has been falling considerably faster in urban areas than in rural areas, whereas the TFR_p measure indicates that fertility has been falling at about the same rate in urban areas and rural areas. The TFR measure also indicates that total fertility has been falling faster among illiterate women than among women with a primary education, and fastest among women with more than a primary education, whereas the TFR_p measure indicates that total fertility has been falling at about the same rate in the first two education groups and fastest in the third. These differences between the results based on the TFR and the results based on TFR_p require further investigation.

The results indicate that, between 1982 and 1986 in the country as a whole, period parity progression ratios changed little in the case of transitions from birth to marriage, marriage to first birth, and first to second birth; fell sharply in the case of transitions from second to third birth and third to fourth birth; changed little in the case of transitions from fourth to fifth birth and fifth to sixth birth; and fell sharply in the case of transitions from sixth to seventh birth and from seventh or higher order birth to next birth.

Appendix

Table A1 Equations for calculating linear trend estimates of TFRs

Characteristic	Equation for TFR
Total	9.4580 - 0.0472 T
Residence	
Urban	12.5971 - 0.0982 T
Rural	8.6162 - 0.0361 T
Education	
No education	8.0222 - 0.0281 T
Primary	5.5899 - 0.0107 T
Beyond primary	7.7698 - 0.0534 T

Note: Linear trend estimates of TFRs for particular calendar years are calculated by substituting a calendar year for T in the equations. When doing so, only the last two digits of the calendar year are used (e.g., 77.5 is used in place of 1977.5).

Table A2 Equations for calculating linear trend estimates of PPPRs, TFR_p, and TMFR_p

Fertility measure	Equation for PPPRs, TFR _p , and TMFR _p
PPPRs	
B→M	1029.6809 - 0.7092 T
M→1	1023.1206 - 0.4728 T
1→2	920.8794 + 0.4728 T
2→3	1415.4468 - 5.6738 T
3→4	1785.2128 - 10.6383 T
4→5	943.4823 - 1.8913 T
5→6	812.6809 - 0.7092 T
6→7	1377.9291 - 7.5650 T
7+→8+	1159.0071 - 5.9102 T
TFR _p	11.8093 - 0.0757 T
TMFR _p	11.9893 - 0.0757 T

Note: Linear trend estimates of PPPRs, TFR_p, and TMFR_p for particular calendar years are calculated by substituting a calendar year for T in the equations. When doing so, only the last two digits of the calendar year are used (e.g., 82.5 is used in place of 1982.5). The PPPRs generated by these formulae are in decimal form (i.e., they are not multiplied by 1,000).

Table A3 Equations for calculating linear trend estimates of TFR_p and TMFR_p by residence and education

Characteristic	Equation for	
	TFR _p	TMFR _p
Residence		
Urban	9.6681 - 0.0709 T	15.5338 - 0.1324 T
Rural	11.1269 - 0.0662 T	10.8757 - 0.0615 T
Education		
No education	10.3845 - 0.0567 T	10.9157 - 0.0615 T
Primary	9.2445 - 0.0567 T	11.7161 - 0.0827 T
Beyond primary	10.5717 - 0.0851 T	10.8517 - 0.0851 T

Note: Linear trend estimates of TFR_p and TMFR_p for particular calendar years are calculated by substituting a calendar year for T in the equations. When doing so, only the last two digits of the calendar year are used (e.g., 82.5 is used in place of 1982.5).

References

- Ayad, Mohamed, Bernard Barrere, and James Otto. 1997. *Demographic and Socioeconomic Characteristics of Households*. DHS Comparative Studies. Calverton, Maryland: Macro International. Forthcoming.
- Ban, Bharat. 1997. Personal Communication. New ERA, Kathmandu, Nepal.
- Cho, Lee-Jay, Robert D. Retherford, and Minja Kim Choe. 1986. *The Own-Children Method of Fertility Estimation*. An East-West Center Book. Honolulu: East-West Center.
- CBS (Central Bureau of Statistics). 1995. *Population Monograph of Nepal 1995*. Kathmandu: Central Bureau of Statistics.
- Dangol, B. D., R. D. Retherford, and S. Thapa. 1997. "Declining fertility in Nepal." *Asia-Pacific Population Journal* 12(1): 33-54.
- Feeney, Griffith. 1986. *Period Parity Progression Measures of Fertility in Japan*. NUPRI Research Paper Series no. 35. Tokyo: Nihon University Population Research Institute.
- Feeney, Griffith, and Yasuhiko Saito. 1985. *Progression to First Marriage in Japan: 1870-1980*. NUPRI Research Paper Series No. 24. Tokyo: Nihon University Population Research Institute.
- Feeney, G., and J. Yu. 1987. "Period parity progression measures of fertility in China." *Population Studies* 41: 77-102.
- Ministry of Health. 1993. *Nepal Fertility, Family Planning and Health Survey 1991*. Main Report. Kathmandu: Ministry of Health.
- Ministry of Health. 1997. *Nepal Family Health Survey 1996*. Kathmandu: Ministry of Health and New ERA. Calverton, MD: Macro International.
- Narasimhan, R. L., Robert D. Retherford, Vinod Mishra, Fred Arnold, and T. K. Roy. 1997a. *Measuring the Speed of India's Fertility Decline*. National Family Health Survey Bulletin, No. 6. Mumbai: International Institute for Population Sciences. Honolulu: East-West Center.
- Narasimhan, R. L., Robert D. Retherford, Vinod Mishra, Fred Arnold, and T. K. Roy. 1997b. *Comparison of Fertility Estimates from India's Sample Registration System and National Family Health Survey*. National Family Health Survey Subject Reports, No. 4. Mumbai: International Institute for Population Sciences. Honolulu: East-West Center.
- Retherford, Robert D., and Iqbal Alam. 1985. *Comparison of Fertility Trends Estimated Alternatively from Birth Histories and Own Children*. Papers of the East-West Population Institute, No. 94. Honolulu: East-West Center.

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Tamang Transitions: Transformations in the Culture of Childbearing and Fertility among Nepal's Tamang

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Introduction

When we were asked to present a paper on the fertility transition among Nepal's Tamang, we naturally accepted. Our work among two Tamang populations has been an ongoing project covering the last 10 years while one of us has been engaged in research in a single Tamang community for over 15 years. And although our work has been concerned with a whole array of transitions, the sets of behaviors surrounding childbearing have certainly been among them.

Nevertheless, we need to make clear that we work as anthropologists. Our orientation is toward community based research in which principal investigators are in close contact with the people they study. The communities are seldom chosen to be representative in the sense of being drawn from a random sample of communities and the intensity of anthropological research methodologies makes it impossible for us to know more than a few communities with the kind of familiarity that allows anthropologists to talk so confidently about so many things. This is all by way of introducing what we mean when we talk about the fertility transition among the Tamang. If by Tamang, we

mean the entire population designated by that label in Nepal, then we cannot speak in empirical terms for the whole group. On the other hand, if we mean by fertility transition that moment when any portion of the entire group begins to consciously control the timing and level of childbearing then we can say that the Tamang have undergone that transition. And we can explore the concrete processes of that transition in those Tamang subgroups and speculate about the kinds of relationships we might be expected to find across the whole population.

That is what we intend to do here. Although our empirical data is largely the result of field research in two widely separated Tamang communities, one in the northernmost Village Development Committee (VDC) of Dhading District and the other just up the road from Kathmandu in the area surrounding Budanilakantha, we want to summarize what we have found in such a way that we can make generalizations to other groups and contribute to our understanding of the range of trajectories by which fertility transition will be accomplished in Nepal. In what follows, we begin with a note on our overall orientation; we follow this with a discussion of the relevance of fertility transition processes among the Tamang for wider groups in Nepal; the rest of our comment will be concerned with the fertility transition in our two study communities and the variety of other transitions that are a necessary part of this change.

Our data come from the Tamang Family Research Project (TFRP), an ongoing micro demographic study of social change, its impact on family relationships and life course transitions, and the consequences of these for fertility. Influenced by the micro demographic research agenda developed by John Caldwell (Caldwell, 1982; Caldwell et al., 1988), the TFRP involves a multidisciplinary team using combined quantitative and qualitative data collection in two Tamang communities (Axinn et al., 1990). One of these communities was, at the time of initial research, five to six days walk from a motorable road; the other was within easy commuting distance from the markets and job opportunities in Kathmandu. These crucial differences were associated with others such as presence of schools, monetization of the household economy, degrees of reliance on agriculture, and exposure to consistent family planning programs. Our data collection strategies resulted in extensive individual level survey data for every person in the two communities aged 12 and above in addition to such qualitative materials as open-ended interview transcripts, observational data, genealogical materials, and more general ethnographic materials for investigating social and cultural processes.

Theoretical Perspective

Our theoretical orientation follows directly on the watershed insight of John Caldwell that fertility is not a simple outcome of individual decision-making outside of larger contexts; rather, fertility levels are a reflection of family organization and fertility transitions are themselves better seen as a part of larger family transitions. For Caldwell, the key transformation enabling fertility transition is the change from a system in which wealth flows are in the direction of junior generations to senior generations to one in which flows are from seniors to juniors, parents to children. It's important to note here that Caldwell's notion of "wealth" broadens out to include--in addition to simple material, labor, and monetary flows--intangibles such as satisfactions, pleasures, and the sense of security that comes of an assured future.

For anthropologists, Caldwell's move to locate fertility transitions within familial and ideational contexts translates quite directly into the longstanding disciplinary interests in social organization, kinship, and culture. It also suggests that, in spite of the fundamental transformation in wealth flows that Caldwell argues to be a key characteristic of all transitions, we might expect to find differences in the surrounding characteristics of these transitions that are linked to relevant variations in pre-transition family and kinship systems and cultural evaluation systems. While this is not the place to develop these notions in detail (they receive more consideration in Fricke, 1997a and 1997b, and in Dahal et al., 1993), these are the underlying assumptions that require any discussion of fertility transition to make reference to surrounding transformations in family and kinship relationships and cultural morality. And this allows us to argue for the relevance of the Tamang.

The Relevance of the Tamang

The Tamang are an interesting group for reasons that go beyond their actual numbers within the population of Nepal. Official statistics on ethnic populations in Nepal are highly problematic in any case, being based on reported mother-tongue in the national census and on other often ill-defined criteria in the surveys that report ethnic identity; in addition to these problems of definition, there is a general lack of consistent data across time for the fully fleshed out ethnic comparisons that would make for strong statements about the sources of variation.

What we do know from the spotty record, however, is that the Tamang and a number of other ethnic groups generally classed as Tibeto-Burman have consistently lower pre-transition fertility levels than those of Indo-Aryan groups (Macfarlane 1976; Ministry of Health, 1977; Ross, 1984; Fricke, 1994). Thus, Fricke reported for Timling during 1981 fieldwork that the total cumulative fertility of women up to age 49 was 5.2 births compared to 6.2 births for women in the Tarai (1994: 91). Even looking at aggregate figures from Banister and Thapa (1981) one finds that fertility drops as one ascends from the Tarai through the Hills to the Mountain regions of Nepal with 6.2, 6.0, and 5.6 total births, respectively. These aggregate figures are, of course, not broken down by ethnicity, but the increasing density of Tibeto-Burman representation in the population as one moves across these regions supports the general conclusion that their fertility is lower.

From analyses with the Tamang we know that this is most likely due to the generally later ages at marriage characteristic of Tibeto-Burman groups in the past (more recently, increasing marriage ages related to education and the like has muddled this simple relationship between ethnicity and marriage). But the tie to systems of kinship and marriage is suggested by the almost identical average ages at marriage (age 19) for Gurung and Tamang, for example, two groups that are distinguished by their cross-cousin marriage systems. These marriage systems are characteristic of a number of Tibeto-Burman groups, especially those in the northern tier of Nepal and sharply contrast with the kinship and marriage systems of high caste Indo-Aryan groups in Nepal in precisely the same ways that other researchers have noted a North and South Indian distinction in marriage and kinship domains, the social standing of women, and demographic patterns (Dyson and Moore, 1983).

Insofar as differences in family system are important, then, we argue that an understanding of Tamang transitions offers more general insights into the full range of transitions among populations characterized by similar kinds of social organization. Understanding Tamang transition dynamics offers the possibility of insights into Gurung, Magar, and other Tibeto-Burman dynamics to the extent that variations in underlying family organization systems can structure the processes of wealth flow reversal. Our reading of the work of John Caldwell and his colleagues in South India (1988) suggested this to us from the beginning when we noted similarities in family transition that were clearly important for the Tamang but were not emphasized beyond

a quick mention in the South Indian work. One of these similarities included a shift in the primary relationships organized or ratified at marriage, so that where past marriages created links between members of senior generations (that is, between fathers-in-law), current marriages in a setting where young men are more likely to hold attractive economic prospects apart from their familial positions tend to involve the establishment of links between a woman's parents and her new husband (that is, a father-in-law/son-in-law link). Such a shift could only be important in a marriage and kinship system in which marriages are central to the creation of lateral links between families, one of the central distinctions between the cross-cousin marrying Tibeto-Burman groups we mention above and the high caste Indo-Aryan groups in Nepal.

Some anthropologists, including the two of us (Fricke et al., 1993; Dahal et al., 1993; Dahal et al., 1996), have called those cross-cousin systems that include a cultural stress on the ethos of reciprocity "alliance" systems. Thus, to use John Caldwell's framework for studying fertility transition in terms of processes of change in wealth flows and increasing individuation among the Tamang is to discover features of transition peculiar to alliance systems. It is these that we will draw out in our discussion.

Tamang Transitions

We turn now to the behavioral transitions that have characterized our two study communities. As we have already mentioned, our communities were chosen to explore family dynamics in markedly different settings inhabited by members of the same ethnic group. Timling, our remote settlement, was chosen to represent a community at one extreme of the continuum of integration into Nepal's rapidly monetizing infrastructure. Located far from roads and markedly subsistence oriented, it was a community with minimal participation in government sponsored programs (Fricke, 1994). Our Kathmandu Valley community, which we call Sangila (Fricke et al., 1991), was in contrast far more integrated into the web of relations characteristic of the rapidly developing areas of the country and may be taken to represent the other end of that continuum.

As we might expect, exposure to formal family planning programs occurred at different times in these settings. Sangila's entry into the fertility transition was well along by the time of our 1987 fieldwork. Timling's had only just begun. A comparison of the different

transitions undergone by these two settings will help us to highlight some of the features of the Tamang fertility transition later in our presentation.

Fertility Transitions

In 1987, when systematic data collection began in Sangila we found that 17% of those 374 ever-married women under age 65 were in unions characterized by some form of contraceptive use (Axinn, 1990 and 1992a). When looked at by birth cohort, the trend toward increasing acceptance of contraception becomes more obvious. Thus, no woman aged 55 or over reported any use of contraception; 12% of women aged 45-54 reported such use; 31% of women aged 35-44 reported contraceptive use; 33% of women aged 25-34 reported such use; and just 7% under 25 reported contraceptive use (Axinn 1992a; see Table 1 of this paper). Mean numbers of children born to these cohorts are 6.4 and 6.1 for the two older groups, 5.0 and 3.4 for the middle groups, and 1.1 for the youngest cohort.

Table 1 Cohort trends in fertility behavior and preferences in Sangila

	Age Group				
	<25	25-34	35-44	45-54	55-64
Average no. children ever born	1.1	3.4	5.0	6.1	6.4
Contracepting (%)	7	33	31	12	0
Desire more children (%)	69	24	9	0	0

Source: Axinn (1990: 76).

The evidence for a behavioral shift toward fertility control is clear in the comparison of the older cohorts. Some of the nature of that shift becomes clear from other statistics. Thus, fertility limitation up to that point was largely directed toward stopping childbearing rather than controlling birth timing. As Axinn (1992a: 509) writes: "In fact, our evidence is consistent with the conclusion that before the decision to stop childbearing, Tamang women find it difficult to articulate their fertility plans. Among women who said they wanted more children, a full two-fifths of the women aged 25-44 were unable to say how many additional children they wanted, even after repeated questioning."

Similarly, fully 77% of the reported contraceptive use involved permanent sterilization and the majority of these sterilizations (69%) were vasectomies.

The prevalence of both contraceptive use as stopping behavior and of vasectomies is reflected in the taped discursive interviews conducted with contraceptive users in Sangila. In discussing the rationales for engaging in contraceptive use, virtually every informant discussed the issue in terms of ultimate family size (with a preference for 3-4 children of which ideally 2 would be sons). The comments of two men, 38 and 46 years old, are typical:

It is good to do family planning. But you do it when you feel that you have a large family size, don't you? (male, 38 years old, ID no. 0070)

I've already told you the benefits of family planning. Because we have no property, it is not a good thing to have a large number of children. We must limit the number of children in consideration of our economic situation (male, 46 years old, ID no. 332).

Regarding the reasoning for preferring vasectomy to laparoscopy, our informants based their preferences on the perceived impact of the operation on the continued ability of the recipient to function in work. Those who felt a vasectomy would compromise the strength of the husband argued for female sterilization while others used the same rationale to argue for male sterilization. In general, most informants perceived the laparoscopy as more threatening to strength because it involved internal body parts.

Timling's transition during this field data collection was far less advanced than that of Sangila. Yet, it is in many respects more dramatic because of the contrast with earlier 1981 fieldwork in which no person reported contraceptive use (Fricke, 1994). Indeed, during that earlier period, informants reported exposure to mobile family planning clinics making their way up the Ankhu Khola Valley while emphatically making the case for their need to engage in unrestricted fertility. Their expressed reasons for having children constituted a textbook example of Caldwell's pretransition model. Children, it was argued were necessary to the well-being of parents and the lineage. The following quotations from discursive interviews make that clear (Fricke, 1994: 183):

Parents without children have a life of sorrow. They do all the work themselves. Who goes to Trisuli to haul salt for them? When they are old who will care for them? And when they die, their brothers will eat their land--

their brothers who have done nothing for them. I want as many children as come...one to send outside the village to work, another to cut wood, yet another to plough. If one dies, there will always be another to work (male, aged 23).

Having many children divides the work and makes sure there are more if some die. Parents will be taken care of. Children tie us to other households. They teach each other their skills (woman, aged 32).

Parents without children have a harder time working. And who will do their death rituals? Who will care for them (woman, aged 60)?

Nevertheless, between 1981 when those interviews were conducted and 1987 when TFRP data collection began five Timling men ventured to a mobile clinic in a neighboring village and became the first men in the village to undergo vasectomy operations (Fricke, 1997a). Prior to 1985, when these men initiated the fertility transition in Timling, the only fertility control for which we have records were in the very rare event of abortion induced by severe trauma among unmarried women who had become pregnant by men unwilling to take them as junior wives (Fricke and Teachman, 1993). The rationale for these abortions had nothing to do with family planning in the conventional sense.

Discursive interviews with these five men revealed similarities with Sangila. That is, family planning was engaged in among all of them for the purposes of stopping childbirth after a desired family size was reached. The same concerns about the effects of the operation on strength were also expressed. Qualitative research since 1987 has suggested that fertility limitation has become more widespread among Tamang of this area, especially among couples who have relocated to a growing migrant community in Kathmandu, but here we wish to focus on the circumstances surrounding the beginning of fertility transition. Before discussing the rationale for fertility control in more detail, we turn next to other family transitions occurring in the two communities.

Family Transitions

Following John Caldwell, our theoretical perspective suggests that we place fertility change within familial contexts. We have explored transitions in individual and family relationships in a number

of papers (for example, Dahal et al., 1996; Dahal et al., 1993; Fricke et al., 1990 and 1998; Fricke et al., 1993) and we summarize some of the relevant findings for the two settings here. Our data come from the surveys administered to all inhabitants of the two communities aged 12 and above, but we confine our discussion to reports for ever-married women (these reports are consistent with findings for ever-married men and, for reports of premarital experience, unmarried respondents).

Life course theory suggests that changes in experience at early stages of the life course will lead to changed experience at later stages. In developing contexts, much attention is given toward variables associated with individual autonomy. Because of the focus on the Tamang, a society we have characterized as organized in alliance terms, we are concerned here with indicators of both individual experience and of relationships between generations within the same family and across families united by marriage.

Increasing economic monetization is one indicator of movement away from the pretransition subsistence economy. Living away from parents before marriage is an indicator of circumstances allowing greater autonomy in personal behavior. For intergenerational relationships, we will look at trends in participation in choice of spouse. For relationships of alliance, we look at the two variables of cross-cousin marriage and the provision of bride service, or free labor, by the husbands of married women. These figures appear in Tables 2 and 3.

Table 2 Cohort trends in individual experience, autonomy, and inter-family alliance in Sangila

	Birth Cohort			Total
	<1946	1946-65	1966-75	
Lived apart from parents (%)	4	11	20	10
Wagework (%)	1	10	33	9
Chose spouse (%)	12	14	25	15
Married non-relative (%)	49	49	58	50
Brideservice (%)	35	41	36	37

Sources: Fricke et al. (1993: 407); Brideservice from Fricke et al. (1998).

Note: The denominators differ for brideservice figures but with no impact on general trends.

The story for both communities is one of transition in all of these indicators. Looking at Sangila women first we can contrast the

experiences of ever-married and ever-cohabiting women born before 1946 with those born between 1966-1975 (figures are from Fricke et al., 1993). For changes in individual experience we find that among those older women only 4% had ever lived away from their parents before marriage compared to 20% of the women in the youngest cohort; similarly, only 1% of the women in the oldest group had worked at wage labor before marriage compared to 33% of the youngest cohort. For choice of first spouse, 12% of the oldest cohort reported the decision to be entirely their own compared to 25% of the youngest group. And for changes in the alliance relationships organized by marriage, we find that 49% of the oldest group reported marrying a person not related as a cross-cousin compared to 58% of the youngest group. Our reports of bride service (from Fricke et al., 1998) are more flat with 35% and 36% reporting it in the two birth cohorts.

Table 3 Cohort trends in individual experience, autonomy, and inter-family alliance in Timling

	Birth Cohort			Total
	<1946	1946-65	1966-75	
Lived apart from parents (%)	14	33	63	28
Wagework (%)	15	27	58	26
Chose spouse (%)	18	42	53	33
Married non-relative (%)	26	33	37	31
Brideservice (%)	82	63	50	69

Sources: Fricke et.al. (1993: 407); Brideservice from Dahal et al. (1996).

Note: The denominators differ for brideservice figures but with no impact on general trends.

Trends on these variables for Timling tell a similar story of change although the levels differ. For changes in individual experience we find that among those older women 14% had ever lived away from their parents before marriage compared to 63% of the women in the youngest cohort; 15% of the women in the oldest group had worked at wage labor before marriage compared to 58% of the youngest cohort. For choice of first spouse, 18% of the oldest cohort reported the decision to be entirely their own compared to 53% of the youngest group. And for changes in the alliance relationships organized by marriage, we find that 26% of the oldest group reported marrying a person not related as a cross-cousin compared to 37% of the youngest group. Bride service transitions (figures are from Dahal et al., 1996)

are much more dramatic for this setting than for Sangila, both in initial level and trend. Here, 82% of the oldest group of women reported their husband's engaging in such labor while 50% of the youngest group reported this service.

Apart from differing levels, our two settings display general trends toward increased non-familial experience, autonomy of individual decision-making, and atomization of the nuclear unit on nearly all of these dimensions. The one exception is for Sangila where the practice of bride service was already at reduced levels for the oldest cohort. Differences between the two settings have to do with differences in their relative proximity to Kathmandu, the influence of high caste Hindu culture, and starting levels and are of less concern to us in this presentation than the fact of transition itself.

Economic Contrasts and Transitions

The individual level transitions listed above both demonstrate the impact of larger structural changes at the individual level and suggest a degree of contextual change at the level of household and community economy. Within communities, the transition has been toward an ever-increasing reliance on monetized pursuits and involvement in the permanent wage labor economy. That transition is, perhaps, most dramatic for Timling where the realities of a declining land base relative to population has encouraged relocations of young people to the Kathmandu Valley and a large rate of recruitment into the Nepali armed forces.

Contrasting economic bases between Sangila and Timling at the time of the original survey suggest that the differential reliance on family networks between the two settings is tied to economic orientation as well. In 1987, for example, Timling showed much higher levels of non-monetary cooperation between families as illustrated by pasturing arrangements in which 79% of the households reported that they pastured their cattle and buffalo with other households; of these co-pasturers, only 6% did so with non-relatives. In Sangila, by contrast, only 31% reported such pasturing arrangements and of these 41% did so with non-relatives.

The availability of permanent, rather than seasonal, employment in Sangila was also much higher with over half the men aged 12 and above in Sangila reporting permanent, year-round employment compared to nearly none of the men in Timling. As with pasturing

arrangements, the greater overall monetization of economic life in Sangila is reflected in help networks for crop harvesting. Timling household heads reported that only 1% of those who helped in a household's harvest were unrelated and that only 2% of those who helped were paid in cash; Sangila household heads, on the other hand, reported levels of unrelated help at 27% and cash payments to 16% of those who helped. These figures are suggestive of Caldwell's point that economic change is a large part of the engine leading to family and fertility transitions (1982).

Moral Transitions

Up to now, we have focussed on behavioral transitions associated with fertility change. It is clear that Tamang fertility transition has occurred along with a number of other individual and family transitions. We have not explored the institutional or program changes that have enabled contraceptive use although they should be obvious in the form of the mobile family planning clinics reaching Timling and the longer presence of such clinics in the Sangila area, encouraged by such development programs as the Small Farmers Development Program in this setting (Axinn, 1990 and 1992b). But Caldwell's demographic transition model suggests deeper evaluative changes in people's thinking. We have referred to these elsewhere as moral transitions (Dahal et al., 1996; Fricke, 1997b) in order to capture a sense of cultural shifts in notions of virtue and obligation.

Caldwell has focussed on a number of general reorientations, central of which is the shift in the balance of obligations from children to parents in the pre-transition context to a flow from parents to children in the transition context. This is, of course, not to say that obligations don't flow in multiple directions in either context—it is a question of expressed moral emphasis in addition to the behavioral fact of material support. We saw in our summary of findings above that Timling informants in 1981 expressed the important functions of children in terms of their provision of labor and services for their parents. Along with those roles, informants were also reluctant to place any restriction on the numbers of children they desired. "I want as many children as come," is how one informant put it. Note here, too, Axinn's report that even in transitional Sangila, women expressing a desire for more children were loathe to discuss the actual number.

Our transcribed discursive interviews with selected informants in both settings revealed a more systematic thinking about the relative

advantages and disadvantages of numbers of children. In both Sangila and Timling, those who had participated in family planning programs as permanent contraceptors tended to suggest that 4 children represented an ideal number. If they mentioned 3, it was always in the context of 2 sons and a daughter while those mentioning 4 spoke in terms of 2 sons and 2 daughters. At one level, the personal calculus involved here is consistent with Caldwell's contrast of pre-transition and transitional environments:

Disaggregation is a product of external observation or, even more significantly, of hindsight. In relatively unchanging societies no one sees the separate bonuses conferred by fertility. The society is made of a seamless cloth.... Indeed, the respondent's ability to see clearly the separate aspects of children's value shows that the old system is already crumbling and children's roles are not as certain as before (1976: 343).

At another level survey data along with our transcript information reveals those more far-reaching transformations in the balance of obligation flows that are also a part of Caldwell's argument. To take the survey information for Sangila first, we note Axinn's finding that the correlations of parental educational attainment with contraceptive use are only weakly positive (Axinn, 1993). Women's schooling had barely begun for those old enough to engage in fertility-stopping contraception while men's schooling was only weakly positive in its correlation with contraception. Children's schooling, on the other hand, had a large positive effect on contraception and a strongly negative effect on desires for more children.

These findings are consistent with our transcripts for Sangila in which the rationale for engaging in family planning was phrased almost entirely in terms of the need to provision children. For an example, listen to the words of one man contrasting the past with the present in Sangila:

No, this kind of thing [discussions of family planning] was not there in the past... In the past, there were no words as such for doing family planning; people did not know much about it. Later, people began talking about issues like whether you could nurture your children or not--and if not, you do family planning. (male 46 years old, ID no. 332)

Or this same man's wife contrasting rich and poor families:

You see... if a person has wealth and room, he can have 6 or seven children and they can all be taken care of. They say that their [richer households' appropriate] family size is increased. But for people who lack this wealth, what can do they do with so many children? So you think about how many children fits the family situation, you see. (female, 44 years old, ID no. 333)

Another woman made the connection with education explicit:

You see, a person has to lead a hard life if he has many children. One has to educate one son, and then later another son. Likewise, one has to send a daughter to school. In consideration of one's own economic situation you need to ask why you would produce many children. It's simply not worth it, am I right, if this kind of thing creates troubles for one's life. (woman, 40 years old, ID no. 639)

In a similar vein, another informant referred to the need to provision children with an inheritance:

You see, what happens is that there is little land and if there are 6 or 7 members in the family, there will be no land left [for the next generation] to even build a house. (man, 31 years old, ID no. 223).

The contrast of these sentiments with those mentioned by Timling informants in 1981 couldn't be more clear. But such cross-sectional contrasts might be argued to be community differences rather than transformations across time. Thus, we turn finally to transcripts from Timling where evidence of a shift toward children's interests are as clear.

In analysis of 1993 discussions about marriage timing in Timling (Fricke et al., 1995), we noted that a shift in arguments around women's marriage age characterized our informants. Younger men and women were much more likely to bring up the need to put off marriage until parents were in a position to properly raise them. They argued that parents must be able to provide for their schooling and other material needs while older informants argued the advantages of earlier ages at marriage to hasten the provision of workers for the household economy. The contrast was striking. Among men the arguments for later ages at

marriage to be able to properly raise children occurred only among those under 45 years of age. While women of all ages argued for the advantages of early childbirth for providing the household with workers, only women in the youngest age groups spoke of the need to provision children themselves.

These shifts toward considerations of child well-being were even more explicit in the transcripts about family planning use. Thus, the argument for needing to provision each child with an adequate inheritance was an overwhelming concern for each of the five men receiving vasectomies in 1985. One man recounted his discussion with another Tamang man on the reasons for getting a vasectomy:

He told me, "Look your grandfather had only four plots of land and he had two sons; so, each son got only two plots of land. And, from these two sons, there came again three sons each and they also divided their land equally into three small plots from their share. And, again, when each has two sons, where are they going to get their next share of land." When he said this kind of thing to me, I thought about it and decided it had to be true. As you know, the number of people is increasing and yet the area of the land stays the same. So, as a result of this kind of deliberation, I did my vasectomy operation. (male, 48 years old, ID no. 2467)

Discussion and Conclusion: A Tamang Transition

The arguments for vasectomy in Timling, given in taped conversations in 1993, offer a clear contrast with the 1981 stress on children as providing opportunities for household diversification. Not that these older arguments have disappeared, as our transcripts for arguments concerning the appropriate ages for marriage indicate. But what we find in 1993 is a shift in the balance of already existing considerations toward an emphasis on children. Thus, all of the men receiving vasectomies couched their discussions in terms of need to support children adequately, to send them to school, and to provide for their inheritances. These considerations were present in 1981 but were consistently in the background of conversations and regarded as unproblematic givens.

In an earlier consideration of the transition in Timling (Fricke, 1997a), we suggested that the adoption of novel behavior in the form of sterilization was, in fact, motivated by a core Tamang ethos stressing

reciprocity and obligation. We argued that this ethos was unchanged, if battered, and that the arguments for resorting to family planning in Timling were an understandable change in behavioral strategies in light of changed material circumstances.

The changed circumstances in Timling are expressed in the excerpted transcript we have just looked at: new arable land for clearing is no longer available and large family sizes will lead to disadvantages for subsequent generations. This is a conservative argument for at least two reasons. First, it assumes that land (rather than success in business or the wage labor market) will continue to be the determinant of self-sufficiency; second, it acknowledges a responsibility to equip the succeeding generation with means for survival. We have treated the reasons why this obligation fits into the wider Tamang ethos stressing exchange and reciprocity in great detail elsewhere (Fricke, 1997a) and lack the time to develop it here. Support for this argument comes from the pre-existing presence of this ethos and its application to children and from a look at the characteristics of the five men of Timling who introduced the fertility transition through their vasectomies.

Standard expectations in the literature would lead us to expect these men to have lived lives embodying novel experiences, to have been exposed to new ideas through schooling or other means, and to have engaged in novel behaviors in other domains of their lives. Our analysis showed that, in fact, these men were among the most conservative of their age cohort. On several dimensions, these men lived lives and had characteristics similar to those most typical of much older Tamang. Only one of these five could read Nepali. Only one had lived away from Timling for a month or longer before his marriage. Only one man married outside of a cross-cousin relationship and all of their marriages were arranged by parents. Finally, all but one of these men performed brideservice for their in-laws after marrying. As a group, these men represent a strikingly lack of innovation. Indeed, one of these men was in 1981 one of the most vocal defenders of the need to have unrestricted fertility.

Yet, in this one area of fertility control, these men are the vanguard of the fertility transition. Our argument is that their doing so is entirely understandable in terms of the guiding ethos of Tamang culture. Change in this initial phase of transition, whatever it may become in the future, is a result of deep cultural continuities that demand new behavior in light of changed material circumstances.

There are, of course, other elements of this transition. The movement away from brideservice in Timling suggests the possibility of future transformations in the ethos that we see as central to Tamang motivation. Other changes in marriage and familial relationships recounted elsewhere (Fricke, 1997b) suggest a good deal of complexity. Our underlying points here, which we only sketch out with reference to a wide range of published materials, is that (1) the Tamang fertility transition highlights both cultural continuity and shift in the light of changed circumstances; (2) suggests that a society organized in terms of alliance strategies activated by marriage may be undergirded by a cultural ethos of a particular type, here called by us the ethos of reciprocity; (3) this ethos may make these populations susceptible to adopting fertility controls in the absence of individual level causes conventionally thought to be necessary to adopting novel behaviors.

Our comparison setting of Sangila, for which we suspect, based on oral testimony, a much more familial orientation in the earlier parts of this century exemplifies a Tamang setting in which many of the elements of contemporary change in Timling have already occurred. Here we see a much sharper boundary between the household unit and wider patriline and clan links in the areas of cooperation, a greater individuation of the moral universe to mix our own terms with those of Caldwell. Once again, this individuation seems to have occurred through the mechanisms of larger structural changes—in land availability and immersion in the monetized economy—and their impacts on individual experience through the life course. At the same time and in spite of these changes, we also see the cultural continuities in marriage behavior and tendencies toward alliance idioms that echo the pre-existing ethos of reciprocity.

References

- Axinn, William G. 1990. "Social Change, Family Organization, and Fertility Limitation: Tests of a theoretical Model among the Tamang of Nepal." Ph.D. dissertation in Sociology, The University of Michigan, Michigan.
- Axinn, William G. 1992a. "Family organization and fertility limitation in Nepal." *Demography* 29(4): 503-521.
- Axinn, William G. 1992b. "Rural income-generating programs and fertility limitation: Evidence from a micro-demographic study in Nepal." *Rural Sociology* 57(3): 396-413.
- Axinn, William G. 1993. "The effects of children's schooling on fertility limitation." *Population Studies* 47(3): 481-493.

- Axinn, William G. and Tom Fricke. 1996. "Community context, natal kin ties, and demand for children." *Rural Sociology* 61(2): 249-271.
- Axinn, William G., Tom Fricke, and Arland Thornton. 1991. "The microdemographic community study approach: Improving survey data by integrating the ethnographic method." *Sociological Methods and Research* 20(1): 187-217.
- Banister, Judith and Shyam Thapa. 1981. "The Population Dynamics of Nepal." *Papers of the East-West Population Institute*, No. 78. Honolulu: East-West Center.
- Caldwell, John C. 1976. "Toward a restatement of demographic transition theory." *Population and Development Review* 2(3): 321-66.
- Caldwell, John C. 1982. *Theory of Fertility Decline*. New York: Academic Press.
- Caldwell, John C., P.H. Reddy, and Pat Caldwell. 1988. *The Causes of Demographic Change: Experimental Research in South India*. Madison: University of Wisconsin Press.
- Dahal, Dilli R., Tom Fricke, and Arland Thornton. 1993. "The family contexts of marriage timing in Nepal." *Ethnology* 32(4): 305-323.
- Dahal, Dilli R., Tom Fricke, and Rajendra K. Lama. 1996. "Family transitions and the practice of brideservice in the Upper Ankhu Khola: A Tamang case." *Contributions to Nepalese Studies* 23(2): 377-401.
- Dyson, Tim and Mick Moore. 1983. "On kinship structure, female autonomy, and demographic behavior in India." *Population and Development Review* 9(1): 35-60.
- Fricke, Tom. 1994. *Himalayan Households: Tamang Demography and Domestic Processes*. Expanded edition. New York: Columbia University Press.
- Fricke, Tom. 1997a. "Culture theory and population process: Toward a thicker demography." In *Anthropological Demography: Toward a New Synthesis*. Eds. David I. Kertzer and Tom Fricke. Chicago: University of Chicago Press. Pp. 248-277.
- Fricke, Tom. 1997b. "Marriage change as moral change: Culture, virtue, and demographic transition." In *The Continuing Demographic Transition*. Eds. Gavin W. Jones, Robert M. Douglas, John C. Caldwell, and Rennie M. D'Souza. Oxford: Oxford University Press. Pp. 183-212.
- Fricke, Tom, William G. Axinn, and Arland Thornton. 1993. "Marriage, social inequality, and women's contact with their natal families in alliance societies: Two Tamang examples." *American Anthropologist* 95(2): 395-419.

- Fricke, Tom, Dilli R. Dahal, Arland Thornton, William G. Axinn, and Krishna P. Rimal. 1991. "Tamang Family Research Project: Summary Report on Ethnographic and Survey Research Conducted March 1987-January 1988." Kathmandu: Center for Nepal and Asian Studies, Tribhuvan University.
- Fricke, Tom and Jay D. Teachman. 1993. "Writing the names: Marriage style, living arrangements, and family building in a Nepali society." *Demography* 30(2): 175-188.
- Fricke, Tom, Arland Thornton, and Dilli R. Dahal. 1990. "Family organization and the wage labor transition in a Tamang community of Nepal." *Human Ecology* 18(3): 283-313.
- Fricke, Tom, Arland Thornton, and Dilli R. Dahal. 1995. "Community and family context, non-familial experience, and first marriage timing: Qualitative and quantitative results from Nepal." Paper presented at the 1995 Population Association of America meetings, San Francisco.
- Fricke, Tom, Arland Thornton, and Dilli R. Dahal. 1998. "Netting in Nepal: Social change, the life course, and bride service in Sangila." *Human Ecology* 26(2): 21-237.
- Holmberg, David H. 1989. *Order in Paradox: Myth, Ritual, and Exchange among Nepal's Tamang*. Ithaca: Cornell University Press.
- Macfarlane, Alan. 1976. *Resources and Population: A Study of the Gurungs of Nepal*. Cambridge: Cambridge University Press.
- Ministry of Health. 1977. *Nepal Fertility Survey 1976: First Report*. Kathmandu: Ministry of Health.
- Ross, James L. 1984. "Culture and fertility in the Nepal Himalayas: A test of a hypothesis." *Human Ecology* 12: 163-181.

Fertility Transition in Kathmandu

Ram Hari Aryal

The onset of the fertility transition is widespread in Asia (Phillips and Sathar, forthcoming) and Latin America (Guzman et al., 1996), and has recently begun in some countries in Africa (Locoh and Hertrich, 1993). Changes in reproductive attitudes and behavior are first evident among the educated and urban segments of the population (Cleland, 1985). This is because many of the prerequisites for the fertility transition such as rising aspirations, changes in the functions of the family, and rising costs of rearing and schooling of children are expected to be associated with urban lifestyles. In Nepal, to the extent that fertility decline has occurred it may be expected to be most apparent in the urban areas.

The purpose of this paper is to document the onset of the fertility transition in Kathmandu, the capital of Nepal. Changes in fertility patterns are examined using various methodologies. The influence of education on fertility differentials is also analyzed.

Data and Methods

The main data for this paper come from a survey conducted in Kathmandu from November 1991 to May 1992 (Aryal, 1995). Households and house number lists, based on the 1991 census provided by the Central Bureau of Statistics, were used as a sampling frame. The 33 wards of Kathmandu city were clustered into seven homogeneous

areas according to socioeconomic and cultural characteristics. From among the clustered wards a total of 16 wards were purposively selected to represent different characteristics of people. Finally, the sample households were selected from this sampling frame for the individual survey.

The sample of households was drawn proportionately according to the total number of houses in the selected wards. Altogether 983 currently married women aged 15-49 were successfully interviewed. I use bivariate analysis to examine the mechanisms causing changes in the fertility patterns of the study population. The extent of fertility control within marriage is assessed using the index of marital fertility control and parity progression ratios.

Results

Fertility Schedule and Fertility Control

Henry (1961) introduced the concept of "natural fertility," i.e., the absence of deliberate birth control. He argued that factors such as breastfeeding and abstinence associated with lactation may result in a reduction in fertility, but these cannot be considered deliberate attempts at birth control. Following this, Coale and Trussell (1974, 1978) developed a standard age pattern of natural fertility and a standard age pattern of deviation from natural fertility. They developed two parameters 'M' and 'm'. 'M' indicates the underlying level of fertility and 'm' indicates the degree of fertility control.

Coale and Trussell (1974: 187) noted that, "marital fertility either follows natural fertility (if deliberate birth control is not practiced), or departs from natural fertility in a way that increases with age according to a typical pattern." The faster fertility falls with age, the greater the amount of fertility control implied and the higher the value of the 'm' index. The greater the value of 'm', the greater the deviation from the natural fertility schedule indicating greater control of fertility. If 'm' equals 0, the shape of the fertility schedule is identical to that of standard natural fertility. The index 'm' is determined entirely by the age pattern of fertility; it is independent of the level of fertility.

Anderson and Silver (1992: 343) found that the indicator works "well when almost all births occur within marriage and when marriage is common by the time women are in their early twenties. It works less well in historical situations of late marriage." Guinnane et al. (1994), using a simulated population, reported that an 'm' value of 0.2

corresponds to a situation in which more than 30 percent of the population practice effective "stopping behavior." However, a value of 'm' less than 0.2 is an indication of the absence of parity dependent control. Guinnane et al. (1994) also found that fertility control initiated at lower parities (younger ages) has less impact on estimated 'm' values so that 'm' may fail to detect the initial stage of the fertility transition. Anderson and Silver (1992) argued, because of a substantial increase in nonmarital fertility in many European countries, the standard measure of fertility control, which assumes that almost all fertility occurs within marriage, may be inappropriate.

In Nepal almost all births occur within marriage (NCP, 1988). Marriage is nearly universal (Ban and Shrestha, 1993) and fertility control at younger age groups is negligible (Pradhan et al., 1993). In view of these characteristics, the index may be considered a suitable measure to examine fertility control behavior in Nepal.

For purposes of examining fertility control behavior within marriage, only 'm' is considered in this analysis. Wilson et al. (1988: 6) observed that, "Scholars interested in studying the decline of fertility during demographic transition have particularly focused on 'm'. The logic for doing so is clear. If the transition is basically a move from natural to controlled fertility, and if changes in the level of fertility are taken care of by varying 'M', the changes in 'm' should indicate changes in the age profile of fertility alone."

Table 1 shows age-specific marital fertility rates for Kathmandu (1992) and all urban Nepal. The data referring to all urban Nepal are from two surveys—the Nepal Fertility and Family Planning Survey of 1986 (MOH, 1987) and the Nepal Fertility, Family Planning and Health Survey of 1991 survey (MOH, 1993). Because Kathmandu is the capital city, hence more advanced than other urban areas in the country, the data referring to all urban Nepal are not strictly comparable with the Kathmandu survey data. Nevertheless, these comparisons provide an opportunity to assess the fertility control behavior of all urban populations in Nepal.

Table 1 Age-specific marital fertility rates (per woman), total marital fertility rates (per woman) and index of fertility control: All urban Nepal and Kathmandu

Age Group	All Urban 1986	All Urban 1991	Kathmandu 1992
15-19	0.189	0.398	0.170
20-24	0.303	0.308	0.301
25-29	0.219	0.174	0.295
30-34	0.133	0.114	0.109
35-39	0.078	0.040	0.038
40-44	0.049	0.017	0.020
45-49	0.000	0.013	0.000
Total marital fertility rate	4.9	5.3	4.7
Index of marital fertility control (m)	0.8	1.3	1.4

Sources: MOH (1987), MOH (1993), and Aryal (1995).

The fertility rate of women in the 15-19 age group in the 1991 survey is higher than that in the 1986 (all urban) and the 1992 Kathmandu survey. This may be due to the fact that women who married early also gave birth very soon after their marriage. Additionally, this should be interpreted cautiously since it is based on a relatively small number of exposed women (Shrestha et al., 1993: 58). Furthermore, there are some births in the 45-49 age group in 1991. These appear to have resulted in a higher total marital fertility rate for 1991 compared to the 1986 urban rate.

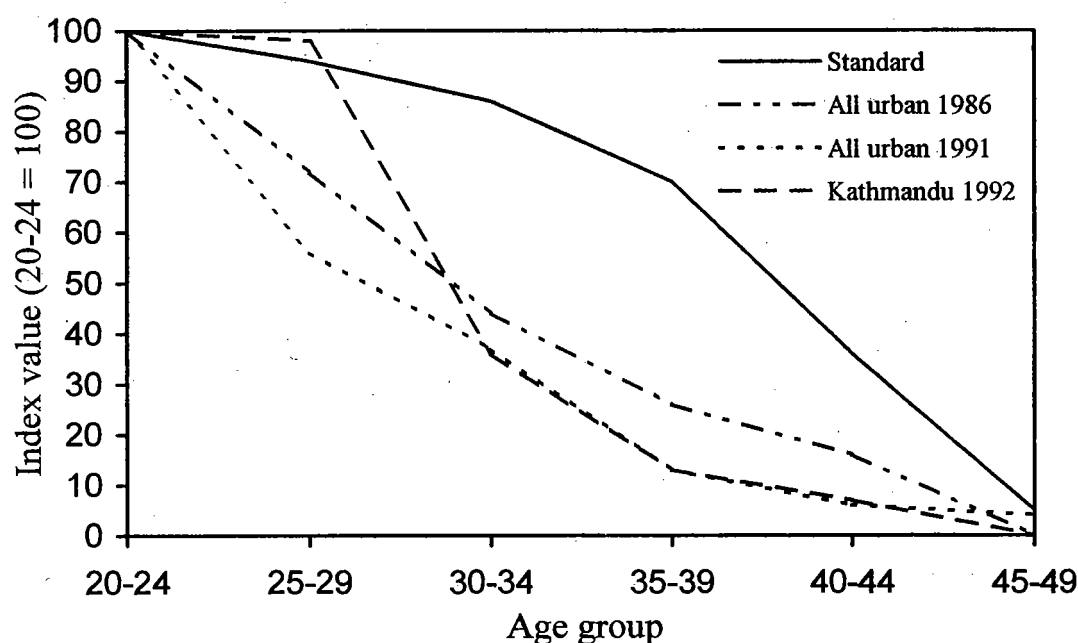
The age pattern of fertility shows that the pattern after age 30 declines sharply in the 1991 survey compared to the 1986 survey, thereby suggesting that the control of marital fertility in urban Nepal 1991 and Kathmandu 1992 is greater than that of urban Nepal 1986. Fertility control behavior in urban Nepal seems to have developed rapidly in recent years.

In societies where couples have preferences for specific family size and control their reproductive behavior accordingly, age-specific marital fertility rates at older ages tend to be low. Coale (1992: 340) states that, "when marital fertility is controlled, it declines more steeply with age than does natural fertility: the older women prevent childbearing more rigorously because a higher proportion of these women want no more children." Furthermore, Knodel (1987: 46) argues that couples concentrate their childbearing in the early part of the

women's fecund period. Once they reach their desired family size they stop further births and, as a result, marital fertility rates are particularly low at older ages. These patterns are clear in Kathmandu and all urban Nepal.

The degree and pattern of deviation from the natural fertility pattern is shown in Figure 1. It shows the index values of the marital fertility schedules (with the rate for the age group 20-24 = 100) and the rate for each subsequent age group expressed as a ratio to that rate. The age-specific marital fertility rates are as shown in Table 1. In the figure, fertility rates below ages 20-24 are not shown since they are considered unreliable (Coale and Trussell, 1974, 1978). The index values of the Coale-Trussell standard marital fertility schedule are also shown.

Figure 1 Index values of age-specific marital fertility rates: Coale-Trussell standard, all urban Nepal (1986 and 1991) and Kathmandu (1992)



In a population in which there is a tendency for increasing control of fertility, the shape of the age-specific marital fertility schedule changes from convex to concave. The curves for all three surveys are concave. However, the curves for Kathmandu (1992) and all urban Nepal (1991) are more concave at older ages than the 1986 urban Nepal curve, indicating higher marital fertility control in

Kathmandu (1992) and all urban Nepal (1991). Although the difference is small, the curve of Kathmandu (1992) is more concave than that of urban Nepal (1991) at older ages, indicating that fertility control behavior is more common in Kathmandu than in other urban areas of Nepal. Coale (1970: 8) noted the most sensitive indicator of the control of marital fertility would be the decline in the age-specific rates above age 30. Although the age pattern of fertility after age 30 is similar in these surveys, the decrease in the age pattern in the older age group is sharp in Kathmandu 1992 and the urban area in 1991 compared to the urban area in 1986.

The Kathmandu survey found considerably higher fertility among women 25-29 than the other two surveys. As a matter of fact, the fertility rate for this age group is even higher than that implied by the Coale-Trussell standard marital fertility schedule. This may have been due to the tendency of younger married women (under age 20) with children to report their age upward (on this point, see Retherford and Thapa, 1998). Consequently, fertility may have been underreported in the 15-19 age group and over reported in the subsequent, 20-24 age group. The quality of data, particularly from the 1992 survey, is of suspect because the rates from the two other surveys are considerably and consistently lower.

At the initial stage of the fertility transition the fall in marital fertility is largest among older women. Knodel (1977: 231) states that, "During the early period of fertility decline, reduction in marital fertility among younger women, aged under 30 for example, is much more modest compared to older women, but as the decline progressed this differential is reduced." He further argues that once parity specific birth control starts to increase it does not turn back to earlier forms of fertility behavior. These findings suggest that couples in urban Nepal are deliberately practicing methods of fertility control. As a result, fertility has started to decline in urban Nepal, particularly in the capital city, Kathmandu.

Parity Progression

Marital fertility control behavior is further examined using parity progression ratios. Parity progression ratios are the observed probabilities of having another child, specific to the number of children that a woman has already had, i.e., a measure of the proportion of women progressing from one to the next birth (Feeney, 1983, 1985). Thus, the first parity progression ratio is the probability for women

with no children to have at least one child, the second parity progression ratio is the probability of having at least two children having had one and so on. These ratios provide an opportunity to examine the nature of changes in the fertility of study populations.

The analysis of parity progression ratios is commonly enhanced by classifying the parity progression by age and marriage duration. In this approach to fertility analysis, the emphasis is on the process rather than on the rates of fertility, although the rates can also be derived. Bhrolchain (1987) states that parity progression ratios can display the completed fertility of the cohorts passing through the childbearing ages during a given period. The use of an age and marriage cohort has the advantage that the parity progression ratios obtained relate to the experiences of groups of real women.

Table 2 shows the parity progression ratios by current age of the women. The data show that over the years there has been a decline in the percentage of women who progressed from zero parity to parity one, from parity one to parity two and so on. For example, in the age group 45 and over, 98 percent progressed from parity two to parity three, 99 percent progressed from parity three to parity four. These ratios are substantially lower for the younger age groups, such as 25-29.

Table 2 Parity progression ratio by age, Kathmandu, 1992

Parity	Current Age Group							All
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
1	0.404	0.710	0.957	0.989	0.994	1.000	1.000	0.905
2	0.210	0.269	0.726	0.933	0.956	0.961	0.980	0.787
3	0.250	0.228	0.438	0.592	0.715	0.929	0.989	0.669
4		0.109	0.375	0.420	0.537	0.692	0.937	0.564
5				0.095	0.189	0.397	0.733	0.402
6+				0.250	0.182	0.160	0.424	0.330

The parity progression ratios by marriage duration provide further evidence of fertility decline in Kathmandu. The patterns of ratios in age cohorts and marriage cohorts are similar (Table 3). About 94 percent of the older cohort, married 20 years and longer, progressed from third parity to fourth parity. However, the corresponding figures for the younger marriage cohorts are small.

I hypothesize that women with more schooling are more likely to have fewer children. Parity progression ratios by years of schooling are shown in Table 4. Among women who have 10 or more years of

Table 3 Parity progression ratio by duration of marriage, Kathmandu, 1992

Parity	Marriage Duration					All
	0-4	5-9	10-14	15-19	20+	
1	0.665	0.989	0.994	1.000	1.000	0.905
2	0.151	0.884	0.945	0.958	0.986	0.787
3	0.037	0.336	0.613	0.768	0.937	0.669
4		0.059	0.284	0.472	0.836	0.564
5			0.074	0.120	0.601	0.402
6+					0.357	0.330

Table 4 Parity progression ratio by years of schooling, Kathmandu, 1992

Parity	Years of Schooling		
	0	1-10	10+
1	0.974	0.914	0.859
2	0.923	0.811	0.678
3	0.883	0.707	0.443
4	0.778	0.500	0.250
5	0.485	0.257	0.275
6+	0.363	0.222	0.250

schooling, 86 percent progressed from zero parity to parity one. The corresponding figure for women who have 1-10 years of schooling is 91 percent and for women who had no schooling it is 97 percent. Similarly, the ratios decrease with higher levels of schooling.

Life-time Fertility

The reported number of children ever born (CEB) is an indicator of completed, life-time fertility. The mean number of children ever born to Kathmandu women is 2.5. About 60 percent of women in the 15-19 age group do not have children; 24 percent of women have 2 children; 21 percent have 3 children (Aryal, 1995), indicating the existence of small family size norms in Kathmandu. Table 5 shows the distribution of cumulative fertility by marriage duration in the study population.

Thirty-four percent of women married for 0-4 years have no children. The majority (57 percent) have one child. For those married

for 5-14 years, the majority have 2-3 children. For those married more than 19 years, the largest percentage have 4-5 children. These data suggest that fertility rises with increasing marriage duration.

Table 5 Percentage distribution of women by number of children ever born (CEB) and marriage duration, Kathmandu, 1992

CEB	Marriage Duration					All
	0-4	5-9	10-14	15-19	20+	
0	33.5	1.1	0.6			9.5
1	56.5	11.5	5.5	4.2	1.3	19.3
2	9.6	58.1	36.3	22.2	5.6	23.6
3	0.4	27.6	41.2	38.8	13.9	20.8
4		1.7	15.2	30.6	36.8	16.1
5			1.2	4.2	27.3	7.2
6+					15.1	3.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Age at Marriage and Age at First Birth

In a society in which out-of-wedlock childbearing is negligible, the age at marriage not only indicates the timing of birth but also indicates the average length of the childbearing period. The age at which women begin childbearing influences a variety of demographic and non-demographic phenomena (Trussell and Reinis, 1989: 127). If timing of the first birth is early there will be a longer period for exposure to the risk of an unwanted pregnancy and thus a greater chance of exceeding the desired number of children if fertility control is imperfect (Trussell et al., 1979). Age at marriage and age at first birth are two related measures of the start of a woman's reproductive life (Trussell and Reinis, 1989: 127).

The birth of the first child not only establishes a bride's credentials as a provider of a potential heir to the family establishment, but also stabilizes the marital unions, and provides her with security, especially if it is a son. Fricke and Teachman (1993: 176) argue that in the Nepali context "a first birth begins a new phase in the cycle of family and household formation process." Bennett (1977) notes that there is a belief in Nepal that it is easier for a woman to have children while she is young and her body is "soft and flexible." Additionally, she found that mothers-in-law exert constant pressure on couples to have a child immediately after marriage. Levine (1987) found that in

Nepal divorce rarely occurs after the birth of a child, especially a son. In a society in which a women's position is associated with childbearing, one way of reducing fertility is to increase the age at marriage, effectively increasing the age at first birth. Due to strong cultural preferences of having the first child soon after marriage, the interval between age at first marriage and first birth is expected to be short.

Table 6 shows mean age at first marriage and age at first birth among women 20-49. (Women under 20 years of age are excluded in this analysis because of the "truncation effect," i. e., many women in the younger group have not had adequate time to begin childbearing.) The data show that there has been an increase in age at marriage over the years. The mean age at marriage for women who are 40-44 is 18.5, while it is 20.1 for those ages 25-29. In contrast, the mean age at first birth has not changed in any significant way. The mean ages at first birth among women ages 25-29 and 40-44 are 22.1 and 21.5, respectively. These data thus indicate that the timing of first birth has remained relatively constant over the years. This provides evidence that fertility regulation following marriage is negligible even among women in Kathmandu.

Table 6 Mean age at marriage (MAM) and mean age at first birth (MAFB) by current age of women, Kathmandu, 1992

Age Group	MAM	MAFB	N
20-24	19.3 (2.5)	20.9 (2.5)	130
25-29	20.1 (3.2)	22.1 (2.9)	201
30-34	19.2 (3.8)	21.6 (3.6)	181
35-39	19.8 (3.6)	22.5 (3.8)	158
40-44	18.5 (3.4)	21.5 (3.4)	102
45-49	16.1 (3.0)	19.7 (3.0)	99
Total	19.1 (3.5)	21.7 (3.3)	871

Note: Figures in the parentheses refer to standard deviation.

Table 7 shows the effect of the modernizing factor—education—on age at marriage and age at first birth in the study population. The strong effect of education on age at marriage is evident. Women who have at least 10 years of education have an average age at marriage of 21.3 years. In contrast, those without any

education are married at 16.6 years on average. Thus, there is a 4.7 year differential between the two population subgroups.

Table 7 Mean age at marriage (MAM) and mean age at first birth (MAFB) by respondents' years of schooling, Kathmandu, 1992

Years of Schooling	MAM	MAFB	N
0	16.6 (2.6)	20.1 (2.4)	254
1-5	17.7 (2.8)	20.8 (2.5)	104
6-10	18.8 (3.2)	20.7 (2.9)	135
10+	21.3 (3.0)	23.4 (3.2)	378
Total	19.1 (3.5)	21.7 (3.3)	871

Note: Figures in parentheses refer to standard deviation.

Education has some effect on the timing of first birth, but the effects are not as strong as those on the timing of marriage. There is essentially no significant difference in age at first birth between women with no education and those with 1-5 or 6-9 years of educational attainment (Table 7). The mean age at first birth is higher (23.4 vs. 20.1) only among women with relatively higher levels of educational attainment (10 or more years).

Discussion and Conclusion

The age-specific marital fertility schedule and index of marital fertility control for the study population in Kathmandu clearly indicate that the fertility transition is underway. Further, the parity progression ratios suggest that there has been a decline in the proportions of women who progress from zero parity to parity one, from parity one to parity two and so on in recent years. Overall these findings give strong evidence of a transition toward two and three child families among the couples in Kathmandu. At the same time, the data indicate that there is a preference for wanting to have children soon after marriage. This study did not include a sample of unmarried women. Hence, the influence of age at marriage on the fertility transition in Kathmandu has not been examined.

Among the married women in Kathmandu, increasing opportunities for nonagricultural work and education are found to have motivated them to reduce demand for children, leading to control of fertility (Aryal, 1995). According to Caldwell (1980: 225-255), the major determinant of the timing of the onset of the fertility transition is

the effect of mass education which brings western ideas and views and speeds up cultural change in the family economy, thereby reversing the direction of intergenerational wealth flows as children become costlier and less productive. This results in a fertility decline as many children become less affordable and less desirable.

Historically, western Europe experienced two types of demographic transitions: the first occurred with the transition from early and universal marriage to a reduction in the proportion married—considered the Malthusian transition and, the second occurred with a reduction in marital fertility which was caused by increased use of contraception—considered the NeoMalthusian transition (Coale, 1975: 349). New aspirations, changes in the functions of the family and new perceptions of costs and benefits of children were believed to be the key factors associated with the transition. More than 40 years ago Notestein (1953: 16) argued that when education and a rational point of view become increasingly important in society, the cost of childbearing increases and the possibilities for economic contributions by children decline. Education is thus considered to be one of the key mechanisms leading to changes in childbearing attitudes and behavior (Caldwell, 1982).

In the study population, education was found to be the main vehicle leading to increased access and higher use of modern methods of contraception (Aryal, 1995). There is a strong positive association between educational attainment of women and their contraceptive use. High use of contraception in Kathmandu is most probably a result of transformations in family relationships due to social changes rather than to vast changes in economic conditions.

Overall, the results lead to the conclusion that fertility has been declining in Kathmandu and other urban areas in recent years. Educational attainment of women is strongly associated with higher fertility control and, hence lower fertility. Fertility control within marriage is mediated largely by increased use of contraception. By implication, the pace at which the fertility transition spreads across other subpopulations in the country may largely be determined by the extent to which mass educational attainment rises and, concomitantly, the availability and accessibility of contraception increases.

References

- Anderson, B. A. and B. D. Silver. 1992. "A simple measure of fertility control." *Demography* 29(3): 343-356.
- Aryal, R. H. 1995. "The onset of fertility decline in urban Nepal: A study of Kathmandu city." Ph.D. dissertation. Adelaide: The University of Adelaide.
- Ban, B. and A. Shrestha. 1993. "Nuptiality." In *Nepal Fertility, Family Planning and Health Survey 1991*. Main Report. Kathmandu: Ministry of Health. Pp. 1-55.
- Bennett, L. 1977. "Mothers milk and mother's blood: The social and symbolic roles of women among the Brahman and Chhetries of Nepal." Ph.D. dissertation. New York: Columbia University.
- Bhrolchain, M. 1987. "Period parity progression ratios and birth intervals in England and Wales, 1941-1971: A synthetic life table analysis." *Population Studies* 41(1): 103-125.
- Caldwell, J. C. 1980. "Mass education as a determinant of the timing of fertility decline." *Population and Development Review* 6(1): 225-255.
- Caldwell, J. C. 1982. *Theory of Fertility Decline*. London: Academic Press.
- Casterline, J. B. and J. Trussell. 1980. "Age at first birth." *Comparative Studies* No. 15. Voorburg: International Statistical Institute.
- Cleland, J. 1985. "Marital fertility decline in developing countries: Theories and evidence." In *Reproductive Change in Developing Countries*. Eds. J. Cleland and J. Hobcraft. London: Oxford University Press. Pp. 223-252.
- Coale, A. J. 1970. "The decline in fertility in Europe from the French revolution to world war II." In *Fertility and Family Planning: A World View*. Eds. S. J. Behrman, L. Corsa, and R. Freedman. Ann Arbor: Michigan University Press. Pp. 3-24.
- Coale, A. J. 1975. "The demographic transition." In *The Population Debate: Dimensions and Perspectives*. New York: United Nations. Vol. 1, pp. 347-355.
- Coale, A. J. 1992. "Age at entry into marriage and the date of the initiation of voluntary birth control." *Demography* 29(3): 333-341.
- Coale, A. J. and T. J. Trussell. 1974. "Model fertility schedules: Variations in the age structure of childbearing in human population." *Population Index* 40(2): 185-201.
- Coale, A. J. and T. J. Trussell. 1978. "Technical note: Finding the two parameters that specify a model schedule of marital fertility." *Population Index* 44(2): 203-207.

- Feeney, G. 1983. "Population dynamics based on birth intervals and parity progression." *Population Studies* 37(1): 75-89.
- Feeney, G. 1985. "Parity progression projections." In *International Population Conference..* Florence, Italy: International Union for the Scientific Study of Population (IUSSP). Vol. 4, pp. 125-136.
- Fricke, T. and J. D. Teachman. 1993. "Writing the names: Marriage style, living arrangements and the first birth interval in a Nepali society." *Demography* 30(2): 175-188.
- Guinnane, T. W., B. S. Okun, and T. J. Trussell. 1994. "What do we know about the timing of fertility transition in Europe." *Demography* 31(1): 1-20.
- Guzman, J. M., S. Singh, G. Rodrigues, and E. A. Pantelides (eds.). 1996. *The Fertility Transition in Latin America*. London: Oxford University Press.
- Henry, L. 1961. "Some data on natural fertility." *Eugenics Quarterly* 8: 81-91.
- Knodel, J. 1977. "Family limitation and the fertility transition: Evidence from the age patterns of fertility in Europe and Asia." *Population Studies* 31(2): 219-249.
- Knodel, J. 1987. "Starting, stopping and spacing during the early stages of fertility transition: The experience of a German village." *Demography* 24(2): 143-160.
- Levine, N. 1987. "Differential child care in three Tibetan communities: Beyond son preference." *Population and Development Review* 13(2): 281-304.
- Locoh, T. and V. Hertrich (eds.). 1993. *The Onset of Fertility Transition in Sub-Saharan Africa*. Liege: Ordina.
- MOH (Ministry of Health). 1993. *Nepal Fertility and Family Planning and Health Survey 1991*. Main Report. Kathmandu: Ministry of Health.
- MOH (Ministry of Health). 1987. *Nepal Fertility and Family Planning Survey Report 1986*. Kathmandu: Ministry of Health.
- NCP (National Commission on Population). 1988. *Population and Development*. Eds. R.D. Pant and S. Acharya. Kathmandu: National Commission on Population.
- Notestein, F. W. 1953. "Economic problems of population change." In *Proceedings of the Eighth International Conference of Agricultural Economists*. London: Oxford University Press. Pp. 3-31.
- Phillips, J. and Z. Sathar (eds.). Forthcoming. *The South Asian Fertility Transition*. Oxford: Claredon Press.
- Pradhan, A. S., A. Shrestha, and R. P. Risal. 1993. "Family planning knowledge and use." In *Nepal Fertility, Family Planning and Health Survey 1991*. Main Report. Kathmandu: Ministry of Health. Pp. 96-130.

- Retherford, R. D. and S. Thapa. 1998. "Fertility trends in Nepal, 1977-1995." *Contributions to Nepalese Studies* Special Issue on Fertility Transition in Nepal, ed. S. Thapa, S. G. Neidell, and D. R. Dahal, 25(Special Issue): 9-58.
- Shrestha, A., R. P. Risal, and A. S. Pradhan. 1993. "Fertility." In *Nepal Fertility, Family Planning and Health Survey 1991*. Main Report. Kathmandu: Ministry of Health. Pp. 56-63.
- Trussell, J., J. Menken, and A. Coale. 1979. "A general model for analyzing the effect of nuptiality on fertility." In *Nuptiality and Fertility*. Ed. L.T. Ruzicka. Liege: Ordina Edition, International Union for the Scientific Study of Population (IUSSP). Pp. 7-27.
- Trussell, J. and K. I. Reinis. 1989. "Age at first marriage and age at first birth." *Population Bulletin of the United Nations* No. 26. New York: United Nations.
- Wilson, C., J. Oeppen, and M. Pardoe. 1988. "What is natural fertility? The modeling of a concept." *Population Index* 54(1): 4-20.

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Determinants of Fertility in the 1970s and 1990s in Nepal

Laxmi Bilas Acharya

Introduction

Reductions in fertility are becoming a common feature of the demography of South Asia. Fertility began to decrease in parts of India in the 1960s (Preston and Mari Bhat, 1984; Rele, 1987). The onset of fertility decline in Bangladesh dates back to the end of the 1970s (Cleland et al., 1994). Some decline in fertility has commenced in Pakistan also (Jaurez and Sathar, forthcoming).

Recent evidence suggests that Nepal has also been experiencing a gradual decline in fertility over the last several years. Tuladhar's (1989) analysis based on the 1986 survey provides some early evidence of the onset of fertility decline in Nepal. Further evidence of the onset of decline in fertility in Nepal has been reported by Dangol et al. (1997) and Retherford and Thapa (1998). Collumbien et al. (1997) have argued that fertility decline in Nepal may have commenced as early as the 1970s.

It is well established that fertility varies by the socioeconomic status of the woman and her family. Some factors have less predictable effects than others. Having reviewed that fertility has started to decline in Nepal, from the policy and programmatic point of view, it is important to identify which factors have fertility-reducing effects. Moreover does the relative importance of these factors change as fertility changes? And to what extent can fertility decline be attributed to changes in the socio-

economic composition of populations? This paper attempts to answer these questions using data from two national fertility surveys of Nepal conducted in mid-1976 and mid-1996 .

Materials and Method

The data used in this paper are from the 1976 Nepal Fertility Survey (NFS) and the 1996 Nepal Family Health Survey (NFHS). Both surveys were conducted under the overall coordination of the Ministry of Health.

The NFS was conducted as part of the World Fertility Survey (MOH, 1977). The aim of the sample design of the NFS was to interview approximately 5000 eligible women.. All ever-married women between 15 and 49 years of age, who were de-facto residents of sample households on the night prior to enumeration were defined eligible for the individual interviews. The design was framed in such a way that the expected sample sizes in the Terai, Hills and Mountains were proportionate to their population sizes. Multi-stage area sampling was applied in selecting districts, *panchayats* and wards successively from these regions. A total of 5,940 eligible women were successfully interviewed from 5,976 households yielding an individual response rate of 97.9 per cent. The NFS collected information under seven broad areas namely, respondent's background characteristics, maternity history, contraceptive knowledge and use, marriage history, fertility regulation, work history and current or last husband's background characteristics.

The NFHS was part of the worldwide Demographic and Health Survey (DHS) project. The NFHS was a nationally representative cross-sectional sample survey which successfully interviewed 8,429 ever-married women out of a total of 8,580 eligible women identified in 8,082 households (MOH, 1997). This survey also had a 98 percent individual response rate.

The NFHS sample was designed to provide estimates of population and health indicators including fertility and mortality rates for the country as a whole and for urban and rural areas separately. The survey provides information on a wide range of issues such as nuptiality, contraceptive knowledge and behavior, demand for contraception, other proximate determinants of fertility, family size preferences, utilization of antenatal services, breastfeeding and food supplementation practices, child nutrition and immunizations, and knowledge about AIDS.

The quality of the data collected in both the 1976 and 1996 surveys has been extensively evaluated (Goldman et al., 1979; MOH,

1997; Retherford and Thapa, 1998; Collumbien et al., 1997). Goldman's study concluded that omission and misdating of births have an increasingly serious effect on fertility estimates for five and more years before the NFS but found that recent events were reported fairly accurately. Overall, the evaluations concluded that omission of ever born children by older women was not serious in either the 1976 or the 1996 surveys.

In this study multiple regression analysis is used to evaluate the relative importance of selected socioeconomic and household variables on fertility. Total change in fertility is decomposed to assess the extent to which changes in fertility between the two survey periods were due to changes in the distribution of women in specific categories of some key variables (compositional effect) and the extent to which changes occurred net of the compositional effect.

The analytical framework in this analysis hypothesizes that fertility, the dependent variable, is affected by a set of socioeconomic and proximate factors. The analytical approach and specification of the variables are similar to those adapted in an earlier analysis (Thapa et al., 1997). The proximate factors considered in the analysis are age at marriage and ever use of contraception. Two related measures of fertility are used: recent fertility (defined as all births in the five years preceding the survey), and cumulative fertility (measured by the number of children ever born). In the analysis of recent fertility women who had less than five years marriage duration at the time of the survey are excluded since these women were not exposed to the full five years for childbearing. In both the surveys about 19 percent of the total ever married women reported having less than five years marriage duration.

The socioeconomic factors included in the analysis are: place of residence, religion, ethnicity, husband's education and occupation, and respondent's literacy and occupation. The choice of these independent variables was limited to those measured in a reasonably comparable manner in both surveys, and by additional consideration of sample distributions. The net effects of these factors on fertility are measured by controlling for the respondent's age, the main demographic variable. (The number of children dead is not considered an explanatory variable of cumulative fertility, since the number of dead children is one of the components of children ever born.)

Results

Trends in Fertility

The P/F ratio method (UN, 1983) is a useful tool for comparison of information on the age pattern of fertility derived from reports of recent births (F) with information on lifetime fertility (P). The age pattern of the P/F ratio enables us to detect if fertility has been changing and to assess the quality of data on lifetime and current fertility. If fertility has been constant, we can use information on the parities of women in their twenties to adjust the current fertility data for under reporting or over reporting of births in the last year. In the case of falling fertility these parities reflect higher fertility during the past few years and so such adjustments produce overestimates of current fertility (Collumbien et al., 1997).

Table 1 P/F ratios and estimates of total fertility rate (TFR) based on births in last year preceding survey date, Nepal, 1976 and 1996

Age Group	1976	1996
15-19	0.86	0.780
20-24	0.98	0.994
25-29	0.95	1.043
30-34	0.92	1.068
35-39	0.93	1.104
40-44	0.93	1.246
45-49	0.94	1.275
Unadjusted TFR	6.33	4.60
Adjusted TFR	6.21	4.70

The P/F ratios and unadjusted as well as adjusted fertility rates from the 1976 and 1996 surveys are presented in Table 1. Adjustment of fertility is based on the P/F ratio for women aged 20-24. The rise in the P/F ratio with age in the 1976 and 1996 survey data provides evidence of falling fertility. The data suggest that reporting of current fertility in the 1976, 1991 and 1996 surveys is fairly accurate.

Differentials in Fertility

In order to analyze changes in recent and cumulative fertility differentials in the two surveys mean number of births per 100 women in the five years preceding the survey and mean number of children ever-born (CEB) are calculated by categories of selected background variables

and the two proximate determinants of fertility. Moreover, statistical significance of gross association between the selected variables and the two measures of fertility are evaluated by the b coefficients estimated by means of simple regression lines. The results are shown in Table 2a and Table 2b.

The data indicate that in 1976 the two proximate variables, age at marriage and ever use of modern contraception, have statistically significant gross association with cumulative fertility but not with recent fertility (Table 2a). Except religion and husband's occupation all other socioeconomic and demographic variables have statistically significant associations with recent fertility in the expected directions. The weak gross effects of religion and husband's occupation on recent fertility in 1976 converted into strong effects by 1996. On the other hand, the strong gross effects of variables such as dead children and husband's education in 1976 changed into mild effects after two decades.

Age at marriage and ever use of contraception have strong significant associations with cumulative fertility. Ever users of contraceptives have, however, higher numbers of children ever born. In 1976 place of residence, region of residence, religion, ethnicity and respondent's occupation had weak associations with cumulative fertility (Table 2a), but after 20 years these variables (except region of residence and ethnicity) exerted significant gross effects on cumulative fertility (Table 2b).

Changes in Socioeconomic and Proximate Factors

Table 3 shows the percentage distribution of ever-married women, by socioeconomic variables and proximate factors, in the two surveys. The percentage of women residing in urban areas increased to 8.4 in 1996 from 2.2 in 1976. The percentage of husbands with schooling has gone up by two years, from 1.4 to 3.7 percent, about a three fold increase in two decades. Similarly a significant shift in husband's occupation has occurred between the two surveys. For instance, whereas 42 percent of respondents' husbands in 1996 were in nonagricultural occupation, it was only 23.3 percent in 1976. Similarly a progressive change in women's literacy is observed during these years. One in five women were reported to be literate in the 1996 survey compared to one in 20 in the 1976 survey. Another noticeable change in the distribution of women is in the ever use of modern contraceptives. Ever use of modern methods was as low as 3.8 percent in 1976 and increased to 34.3 percent in 1996.

Table 2a Recent and cumulative fertility differentials by socioeconomic variables and proximate factors, Nepal, 1976

Variables	Recent Fertility		Cumulative Fertility	
	Births in 5 years ^a		CEB	
	Mean	b values	Mean	b values
Place of residence		-.036**		.008
Rural	115		3.3	
Urban	92		3.5	
Region of residence		.038**		-.006
Mountain and Hill	111		3.3	
Terai	119		3.3	
Religion		-.002		.028
Non-Hindu	115		3.0	
Hindu	114		3.3	
Ethnicity		.037**		.008
Non-Terai origin	113		3.3	
Terai origin	125		3.3	
Age ^b		-.374**		.678**
15-24	136		1.0	
25-34	149		3.4	
35+	70		5.4	
Dead children ^b		.062**	ni	na
<2	111			
2+	123			
Husband's education ^b		.047**		-.168**
<6 years	113		2.7	
6+ years	129		2.3	
Husband's occupation		-.014		-.068**
Agriculture	115		3.4	
Non agriculture	112		3.0	
Respondent's literacy		.031*		-.079**
Illiterate	114		3.3	
Literate	127		2.5	
Respondent's work		-.044**		.018
No work	121		3.2	
Some work	111		3.3	
Age at marriage ^b		.001		-.112**
<16 years	115		3.6	
16+ years	114		2.9	
Ever use of modern contraception		.022		.132**
No	114		3.2	
Yes	125		5.2	
All women	114		3.3	

Significant at ** p<.01; *p<.05.

a Mean number of births per 100 females in the five years preceding the survey.

b While estimating the b coefficients these variables were introduced as continuous.

ni = not included, na = not applicable.

Table 2b Recent and cumulative fertility differentials by socioeconomic variables and proximate factors, Nepal, 1996

Variables	Recent Fertility		Cumulative Fertility	
	Births in 5 years ^a		CEB	
	Mean	b values	Mean	b values
Place of residence		-.110**		-.074**
Rural	96		3.5	
Urban	64		2.9	
Region of residence		-.030**		-.004
Mountain and Hill	94		3.5	
Terai	89		3.4	
Religion		-.063**		-.027*
Non-Hindu	107		3.6	
Hindu	90		3.4	
Ethnicity		.024*		.017
Non-Terai origin	91		3.4	
Terai origin	96		3.5	
Age ^b		-.524**		.700**
15-24	154		1.2	
25-34	118		3.5	
35+	43		5.4	
Dead children ^b		.016	ni	na
<2	93			
2+	88			
Husband's education ^b		-.022		-.272**
<6 years	93		3.9	
6+ years	89		2.5	
Husband's occupation		-.043**		-.143**
Agriculture	95		3.8	
Nonagriculture	87		3.1	
Respondent's literacy		-.048**		-.252**
Illiterate	94		3.8	
Literate	82		2.2	
Respondent's work		.029*		.113**
No work	85		2.8	
Some work	93		3.6	
Age at marriage ^b		.042**		-.222**
<16 years	87		3.9	
16+ years	97		3.0	
Ever use of modern contraception		-.160**		.167**
No	104		3.2	
Yes	74		4.0	
All women	92		3.4	

Significant at ** p<.01; *p<.05.

^a Mean number of births per 100 females in the five years preceding the survey.^b While estimating the b coefficients these variables were introduced as continuous.

ni = not included, na = not applicable.

Table 3 Percentage distribution of ever-married women by the household and individual characteristics, Nepal, 1976 and 1996

Variables	1976	1996	Difference (1996-1976)
Socioeconomic characteristics			
Mean year of education of household head	na	2.4	na
Household with toilet facility	na	22.4	na
Household with radio or TV	na	41.8	na
Urban residence	2.2	8.4	6.2
Residence in Terai region	41.7	50.5	8.8
Hindu religion	91.5	87.4	4.1
Ethnic groups of Terai origin	9.6	27.0	17.4
Mean age of the respondent	29.9	30.6	0.7
Mean number of dead children	0.9	0.6	0.3
Mean year of husband's education	1.4	3.7	2.3
Husband in nonagricultural occupation	23.3	42.0	18.7
Respondent literate	6.2	20.9	14.7
Respondent have some work	68.0	83.7	15.7
Proximate factors			
Median age at marriage	15.0	16.0	1.0
Ever used contraceptives	3.8	34.3	30.5
Total number of ever-married women	5,940	8,429	

na = not available.

The changes in education, occupation and use of modern contraceptives are most probably due to program efforts rather than to sampling. However, a substantial increase in the percentage of ever-married women in Terai originated ethnic groups during the two surveys (an increase from 9.6 to 27.0) is most likely due to definitional reasons rather than an increase in the proportion of such women in the national population.

Data indicate that the median age at marriage has increased by one year and the mean number of dead children has gone down by about 30 deaths per 100 women in the twenty years. A substantial proportion of women reported to have some work outside the home in 1996 (83.7 percent) compared to the proportion reported in 1976 (68 percent). The 1996 survey collected some household level information also. Data presented in Table 3 show that mean years of education of the household head is 2.4 years, about 22 percent of households have access to toilets, and about 42 percent have access to radio or TV.

Multiple Regression

Multivariate analysis of recent fertility (births during the five years preceding the survey) indicates that the age of the respondent, number of dead children, husband's occupation, respondent's work status and the two proximate variables had strong net association with fertility in 1976 (Table 4). The scenario is, however, slightly different for cumulative fertility. Six variables—religion, ethnicity, age of the respondent, husband's occupation, age at marriage and ever use of modern contraceptives—have strong effects on cumulative fertility. The notion that in high fertility communities demographic and proximate factors play dominant roles in fertility reduction is supported by the 1976 survey. This is further supported by the regression analysis of recent and cumulative fertility from the 1996 survey. In addition, other variables such as place of residence, religion, husband's education and respondent's literacy exert strong effects on recent as well as cumulative fertility in the 1990s.

The explanatory power (R^2) of the regression model of recent fertility almost doubles in 1996 from the level of 21.7 percent in 1976. This is another indication that socioeconomic variables have started to play an important role in fertility reduction in Nepal. However, the power of the model does not change during these years in the regression model of cumulative fertility. Further, in the regression models for recent and cumulative fertility in 1996 in which only socioeconomic variables were introduced the R^2 values were 2 percent and 10 percent, respectively. The major contribution to the increase in R^2 was the age of the respondent, which is not surprising.

In a society like Nepal household characteristics are also expected to play an important role in fertility differences. Women from households with better educated household heads may have more access to radio and TV. These women are likely to have different fertility behaviors than their counterparts. Access to toilet, and radio or TV could be taken as the proxy for economic status of the household. As previously mentioned, such information was not collected in the 1976 survey.

In order to analyze the effects of household factors on fertility, regression models (using 1996 survey data) were run by adding these variables to the previous models. The effects of household variables on the regression models were significant on recent fertility but only mild on cumulative fertility (results not shown). The addition of these variables did not, however, contribute to increasing the explanatory power of the models. Further because of lack of data in the earlier

Table 4 Effects^a of socioeconomic variables and proximate factors on recent^b and cumulative^b fertility among females 15-49, Nepal, 1976 and 1996

Variables	Recent Fertility		Cumulative Fertility	
	1976	1996	1976	1996
Socioeconomic characteristics				
Urban residence ^c	-.022	-.057**	-.009	-.039**
Residence in Terai region ^d	-.023	-.053**	.001	-.009
Hindu religion ^e	-.017	-.053**	.028**	-.032**
Ethnic groups of Terai origin ^f	.018	-.001	.037**	.003
Current age of the respondent ^g	-.518**	-.624**	.693**	.655**
Number of dead children ^g	.253**	.192**		
Husband's education ^g	-.014	-.048**	-.014	-.053**
Husband in nonagricultural occupation ^h	-.037**	-.041**	-.023**	-.033**
Respondent literate ⁱ	.002	-.054**	-.002	-.046**
Respondent has some work ^j	-.048**	-.017	-.007	.016
Proximate factors				
Age at marriage ^g	.141**	.110**	-.216**	-.192**
Ever used contraceptives ^k	.048**	-.064**	.092**	.091**
R ²	21.7	35.5	50.7	55.2
F-ratio	106.08**	308.17**	520.12**	925.04**
Number of cases	4,617	6,734	5,582	8,284

Significant at **p<.01; *p<.05.

a Results are based on multiple regression analysis. In each model the dependent variable is continuous. b Recent fertility refers to births during five years preceding the survey and cumulative fertility refers to children ever born. c Coded as 0 = rural, 1 = urban. d Coded as 0 = Mountain and Hill, 1 = Terai. e Coded as 0 = Non-Hindu, 1 = Hindu. f Coded as 0 = other ethnic groups, 1 = ethnic group of Terai origin. g Continuous variable. h Coded as 0 = husband in other occupation, 1 = in nonagricultural occupation. i Coded as 0 = illiterate, 1 = literate. j Coded as 0 = no work, 1 = have some work. k Coded as 0 = never used, 1 = ever used modern contraceptive methods.

survey, we are not able to compare the effects of these variables with the 1970s period.

Overall, the results indicate that socioeconomic factors such as urban-rural residence, husband's occupation and women's literacy are emerging as significant predictors of both recent and cumulative fertility in the 1990s when fertility has declined slightly. Fertility is low among women living in urban areas, whose husbands have nonagricultural occupations and who are literate. How much of the change in the total fertility rate (TFR) between the two surveys is due to the change in the urban-rural composition of ever-married women, and how much change can be assigned to real change within the sub-groups?

Table 5 shows the decomposition of changes in the total fertility rate (TFR) between 1976 and 1996. The decomposition procedure applied here is similar to that of age standardization for crude birth and death rates (see for example, Shryock and Siegel, 1976: 284-288.) The urban population of ever-married women in the 1996 sample increased from 2.2 percent to 8.4 percent in the 1976 sample. The results show that only 21 percent of the decline in fertility between these two periods is due to this change in composition. About 79 percent of the decline in fertility is within the sub-groups. Fertility has declined considerably more in urban than in rural areas.

Table 5 Decomposition of the change in total fertility rate (TFR) between 1976 and 1996, Nepal

Variable	1976		1996		Change in TFR (1976-1996)
	Women (%)	TFR ^a	Women (%)	TFR	
Place of residence					
Rural	97.8	6.33	91.6	5.24	1.09
Urban	2.2	5.33	8.4	3.46	1.87
Change attributable to intra-class decline	79.0				
Change due to composition	21.0				
Husband's occupation					
Agriculture or other	76.7	6.41	58.0	5.31	1.11
Nonagriculture	23.3	5.84	42.0	4.41	1.43
Change attributable to intra-class decline	86.5				
Change due to composition	13.5				
Respondent's Literacy					
Illiterate	93.8	6.27	79.1	5.24	1.03
Literate	6.2	5.61	20.9	3.46	2.15
Change attributable to intra-class decline	84.4				
Change due to composition	15.6				
All	100	6.26	100	4.92	1.34
Number of women	5,940		8,429		

a TFR is calculated using the births in the five years preceding the survey. In 1976 the number of total women in 5 year age groups for sub-groups of the population are obtained by inflating the number of ever-married women (inflating factors are based on the total population).

Similarly, decomposition of the TFR by categories of husband's occupation and respondent's literacy shows that about 15 percent of the change in the TFR is attributable to the change in

population composition and the remaining 85 percent is the real change within the sub-groups. Hence, we may conclude that the observed decline in fertility between the two periods is not solely due to changes in the composition of population characteristics.

Discussion and Conclusion

Nepal is in the early phase of the fertility transition when decline in fertility is slow, from a TFR of 6.2 (adjusted) in 1976 to a TFR of 5.1 in 1996. Marriage is universal (Acharya, 1989 and 1993), and women try to become pregnant as soon as possible after marriage to establish their position within the household. For instance, by the age of 19, more than three-fourths enter motherhood, and by the age of 24 almost 96 percent of ever-married women enter motherhood, suggesting that timing of marriage is synonymous with initiation of childbearing (Thapa et al., 1997). In this context early marriage and early childbearing have strong positive effects on fertility. Conversely, late marriage and higher age at first birth have fertility-reducing effects.

Although the level of contraceptive use was low in the 1970s, it showed a statistically significant association with both recent and cumulative fertility. In the 1990s, ever use of contraception had a significant negative effect on recent fertility, but a significant positive effect on cumulative fertility. The positive association between contraception and cumulative fertility may be related to the use of particular contraceptive methods. Sterilization is the most commonly used contraceptive method in Nepal (Thapa and Pandey, 1994). In both surveys, about 67 percent of current users (currently married nonpregnant women) reported use of sterilization. For most couples in rural Nepal family planning means termination of childbearing. In this context, contraceptive use is most likely to be the consequence of having had high fertility (Thapa et al., 1997). In other words contraceptive use is determined by previous fertility, rather than in determining fertility. In a previous analysis based on the 1996 survey, Thapa et al. (1997) found the direction of the relationship between contraceptive use and fertility becomes inverse around the age of 30, suggesting that the fertility-inhibiting effect of contraceptive use becomes pronounced only after age 30.

In conclusion, this analysis of the data from two good quality surveys taken 20 years apart shows that fertility has begun to decline in Nepal. Of the two proximate factors—age at marriage and contraceptive use—the former has a strong inverse association with

cumulative fertility in both the 1970s and 1990s. Contraceptive use has, however, a positive association with fertility. This is most likely due to the fact that contraception is used largely by those who have achieved their desired fertility. Thus, the family planning program appears to be gaining a strong foothold in giving couples the means to limit childbearing. Its other role—that of spacing births—appears minimal. This other role may be expected to be strong only when a significant proportion of Nepali couples begin to consider using contraception for spacing births. Aside from the role of the proximate factors, women's literacy, husbands' education and nonagricultural occupation have also emerged as important fertility-inhibiting social factors in the 1990s in Nepal. The results provide strong support for continued investment in the family planning program and other social development factors (e.g., improvements in educational attainment and higher age at marriage) that could contribute to greater reductions in fertility in the future.

References

- Acharya, L. B. 1989. "Regional differentials in nuptiality and fertility in Nepal." Paper presented at the Cairo Demographic Centre Annual Seminar of Studies in African and Asian Demography, Cairo Demographic Centre, Cairo, Egypt
- Acharya, L. B. 1993. "Nuptiality levels and trends in Nepal." In *Population Dynamics in Nepal*. Ed. Bal Kumar K. C. Kathmandu: Central Department of Population Studies, Tribhuvan University.
- Cleland, J., J. S. Phillips, S. Amin, and G. M. Kamal. 1994. *The Determinants of Reproductive Change in Bangladesh*. Washington D.C.: The World Bank.
- Collumbien, M., I. M. Timaeus, and L. B. Acharya. 1997. "The onset of fertility decline in Nepal: A reinterpretation." *Centre for Population Studies Research Paper Series*, 97-2. London: Centre for Population Studies, London School of Hygiene and Tropical Medicine.
- Dangol, B. D., R. D. Retherford, and S. Thapa. 1997. "Declining fertility in Nepal." *Asia-Pacific Population Journal* 12: 33-54.
- Goldman, N., A. J. Coale, and M. Weinstein. 1979. "The quality of data in Nepal Fertility Survey." *WFS Scientific Reports* No. 6. Voorburg, Netherlands: International Statistical Institute.
- Juarez, F. and Z. A. Sathar. Forthcoming. "Emerging evidence of fertility change in Pakistan." In *Brass Tacks*. Eds. Basia Zaba and Alaka Basu. Oxford: Oxford University Press.

- Ministry of Health (MOH). 1977. *Nepal Fertility Survey 1976*. First Report. Kathmandu: Ministry of Health.
- Ministry of Health (MOH). 1997. *Nepal Family Health Survey 1996*. Kathmandu, Nepal and Calverton, Maryland: Ministry of Health, New ERA, and Macro International Inc.
- Preston, S. H. and P. N. Mari Bhat. 1984. "New evidence on fertility and mortality trends in India." *Population Development Review* 10, 481-503.
- Rele, J. R. 1987. "Fertility levels and trends in India 1951-81." *Population and Development Review* 13: 513-530.
- Retherford, R. D. and S. Thapa. 1998. "Fertility trends in Nepal, 1977-1995." *Contributions to Nepalese Studies* Special Issue on Fertility Transition in Nepal, ed. S. Thapa, S. G. Neidell, and D. R. Dahal, 25(Special Issue): 9-58.
- Shryock, H. S. and J. S. Siegel. 1976. *The Methods and Materials of Demography*. Condensed Edition. New York: Academic Press
- Thapa, S., L. B. Acharya, and R. H. Aryal. 1997. "Schooling, marriage, work, and childbearing among the youth population of Nepal: Emerging insights and challenges." Paper presented at the Workshop on Youth Across Asia, 23-25 September, 1997, Kathmandu, Nepal.
- Thapa, S. and K. R. Pandey. 1994. "Family planning in Nepal: An update." *Journal of the Nepal Medical Association* 32(111):131-143.
- Tuladhar, J. M. 1989. "The onset of a fertility decline in Nepal." *Asia-Pacific Population Journal* 4(3): 15-30.
- UN. 1983. *Indirect Techniques for Demographic Estimation*. New York: United Nations.

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Moslem and Non-Moslem Fertility Differences in the Eastern Terai of Nepal

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Introduction

Moslem societies or groups often have higher fertility and lower contraceptive use than do neighboring groups (see, for instance, Kirk, 1968; Weeks, 1988). There is, however, little reason to believe that these differences are rooted in religious dogma (Obermeyer, 1994a, 1994b). The Qur'an does not contain straightforward injunctions against the use of contraception and Moslems do not consistently report that "contraception is against their religion."¹ Using data recently collected in Nepal's eastern Terai, we focus on another possible explanation, i.e., that Islam engenders a more intense form of patriarchy relative to other groups (Caldwell, 1986). Strongly patriarchal gender systems could support higher fertility levels and limit contraceptive use by 1) providing strong motivations for childbearing, and 2) constraining both women's exposure to and ability to implement innovative fertility behaviors. In Nepal, contraceptive use requires innovative behavior. Although 1991 estimates suggest 24 percent of currently married, nonpregnant women (15-49) use contraception, only about 15 years earlier (in 1976) contraceptive prevalence was estimated at three percent (NIV, 1993: 112).

We explore these explanations using data from three groups in the Eastern Terai of Nepal, within Sunsari District: 1) Moslems residing in three Moslem villages; 2) Mahatos, a Hindu Terai caste traditionally involved in the agricultural production of vegetables; and 3) Tharus, a Terai ethnic group that practices a form of Hinduism that has been influenced by indigenous religious practices. Among the two Hindu ethnic groups, Tharus experienced a unique recent history that serves to disenfranchise them from dominant, caste Hindu groups.²

We find clear evidence that Moslems want more children than either Hindu ethnic group. Among women who do not want any more children, Moslems are also less likely to be using contraception. Counter to the explanation above, we find no evidence that these religious/ethnic differences can be explained by a stronger system of patriarchy within the Moslem communities (i.e., by the lower autonomy/power of Moslem women). These results are very similar to those reported by Morgan et al. (1998).

Given the inability of patriarchy to explain the Moslem/non-Moslem difference, we argue that the *minority status* of Moslems "within local, national and global political contexts" (Morgan et al., 1998) likely plays a role. Although Moslems are the third largest religious group in Nepal, they represent a distinct minority, constituting only 3.5 percent of the population (CBS, 1993). The majority population is comprised of Hindus and, to a lesser extent, Buddhists. Tensions between Moslem and non-Moslem religious/ethnic communities may foster segregation, and a preoccupation with cultural identity (Moghadam, 1992). Moreover, our fieldwork suggests that there is a tendency for antinatalist programs and rhetoric to be viewed as an arm of the "state"; an observation that is consistent with the strong presence of government family planning programs in Nepal. Antinatalist interventions are further viewed as extensions of the political and social elite, a group that historically has been comprised of majority group members (Seddon, 1987); family planning programs must, therefore, suit majority group interests, perhaps at the expense of those of minority groups. In such situations, opposition to antinatalist majority interests can become part and parcel of a minority group identity, as groups seek to stake out a domain for themselves that is viewed as both highly important for the continued economic and social success of families, and deeply personnel. This argument has clear implications for the provision of health services to these minority communities.

Group Differences and Fertility

The groups studied here are not simply "religious" groups. Therefore, identifying a single difference among the groups that accounts for fertility differences is difficult. The three groups included in this analysis are ethnic groups with distinct cultural identities, settlement patterns and histories of interactions with the national government (hence, their designation as religious/ethnic groups in this paper). Nonetheless, an important distinction occurs between Moslem and Hindu communities; interaction between these groups is often quite limited, or tends to be focused in certain characteristic domains, for example, trade activities in roadside bazaars.

We will first consider existing arguments in the social and demographic literatures that have been applied very broadly in attempts to explain religious/ethnic differences. Specifically, Caldwell (1986: 175) suggests a global effect of Islam on demographic behavior; his explanation focuses upon gender systems, and the presumption that strongly patriarchal elements of Islamic societies set them apart from other groups. Writing about mortality differentials between Moslems and non-Moslems across a range of countries, Caldwell says: "These mortality differences are not necessarily inherent in religions, nor immutable (as noted below). They are important at present, however. The central aspect of the relationship between Islam and mortality levels is undoubtedly the *separate and distinctive position of women* operating partly through access to education but also in many other ways." (emphasis added)

Although referring to mortality differentials, Caldwell's argument can be extended to fertility. A number of empirical studies have suggested that more extreme forms of patriarchy can retard fertility decline (Dyson and Moore, 1983; Basu, 1992). Patriarchal aspects of family systems, and especially those that may facilitate or impede women's ability to make or influence reproductive choices, have been the focus of much of our recent work (Morgan and Niraula, 1995; Niraula and Morgan, 1996).

In this paper we ask whether selected Moslem communities in the eastern Terai have higher fertility (than non-Moslem ones) because they are more intensely patriarchal. We chose Tharu and Mahato groups as comparisons because both groups are reputed to afford women relatively higher status, i.e., they are less strongly patriarchal. A comprehensive series of anthropological studies on the status of women

in various ethnic groups in Nepal provided a basis for our selection of the Tharu communities (Acharya and Bennett, 1981). In a comparison of eight study sites in Nepal, Acharya and Bennett show that the Tharu setting in western Nepal holds a middle ranking when measures of women's power/autonomy are considered. Mahato communities were chosen based upon the experience of one of the principle investigators,³ and upon preliminary fieldwork. As a traditional vegetable growing caste, the Mahato utilized the labor of women alongside men. This fact was reputed to increase the status of women relative to other groups, in which the economic roles of men and women were more severely segregated.

Four dimensions of women's power/autonomy were operationalized, adding empirical support for differences in women's status across sampled communities. These four dimensions include, freedom of movement within the village, economic power (i.e., the ability to influence household, economic decisions), economic autonomy (i.e., the ability to make purchases without permission) and freedom from coercive controls (i.e., freedom from fear or abuse from husband). Specifically, we will look to these four measures for support for the hypothesis that women's status mediates the relationship measures between religion and two measures of fertility, i.e., women's desire for additional children and unwanted fertility.

The absence of power/autonomy could limit women's ability to act in innovative ways and could increase the value of children. First, does the Islamic emphasis on modesty, exemplified in the practice of female seclusion or *purdah*, afford women lesser freedom of movement, effectively limiting their ability to implement reproductive choices? It might in a very direct way. If women have substantial freedom of movement (i.e., their movements are monitored less) then they are more free to implement their reproductive choices, for example, through self-motivated visits to health clinics or other providers of contraceptives. If women are required to seek permission from husbands or elders to go to health clinics, it is implicit that women require at least their tacit, if not explicit, approval to use contraceptives. Perhaps more important, constraints on women's mobility can limit exposure to ideas external to the group. Constraints on people's exposure to ideas, and particularly novel ideas or technological innovations, could pose barriers to the introduction and spread of modern methods of contraception.

Patriarchal systems can also increase the demand for children because they usually limit women's nonfamilial opportunities for social status and economic support. These constrained options (indicated by low

economic power or autonomy) focus women's attention on family and children. Women's well-being in such settings is heavily dependent on children to establish status with the family and to provide support in old age (Cain et al., 1979; Cain, 1984).

Ongoing analyses by Morgan, Stash, Mason and Smith (1998) address these same questions for selected communities in four South Asian countries: India, Malaysia, the Philippines, and Thailand. The Morgan, et al. data come from the Status of Women and Fertility Project (SWAF, Mason and Smith and primary investigators Jejeebhoy, Sathar, Chayovan, Nagaraj, and Raymundo). The SWAF project was designed to test how variation in women's power/autonomy influences fertility behavior. Work reported here links closely to the SWAF project, adopting both their sampling strategy and a number of their survey instruments. Thus, we have the opportunity to compare results for these Nepali communities with those surveyed in the SWAF countries. The Morgan et al. results provide no evidence for the first hypothesis above, i.e., that more extreme patriarchy can explain the higher fertility of Moslem communities. Specifically, Morgan et al. do generally find evidence of higher fertility in Moslem communities. Moslems report more children ever born and surviving. Moslems, in most settings, are also more likely to say that they want more children. Finally, if they want no more children, Moslems are uniformly less likely to be using contraception. But these differences are not attenuated by statistical controls on measures of wives' power or autonomy. Only on measures of freedom of movement did Moslem wives consistently score below non-Moslems (also see Mason et al., 1997). These freedom of movement measures were not a powerful and consistent predictor of any of the fertility measures. Similar results for these Nepal settings would further challenge the claim that Moslem/non-Moslem fertility differences emanate from the "separate and distinctive position of women" in Moslem communities.

Given the inability of differences in wives' power/autonomy to explain the pervasive Moslem/non-Moslem fertility differences, Morgan et al. offered a post-hoc explanation that emphasizes the political insecurity of Moslem populations. These explanations are related to the concept of a *minority group status effect* that has a long history in fertility research (see Goldscheider and Uhlenberg, 1968; Day, 1968). The minority group status effect can be pro- or antinatalist depending upon opportunities available to the group and need not apply only to populations that are minorities within a given political entity. Morgan et

al. cite Moghadam (1992) who argues that political opposition to Islam, on global and local scales, and social change accompanying development, engender a preoccupation with Islamic identity that strengthens patriarchal identity. Such a Moslem community response could generate and sustain pervasive differences in fertility norms and in behavior. Morgan et al. argue that such a group response could influence motivation to control fertility and the accessibility and acceptability of using contraception. This argument resonates with some of our observations and with interviews.⁴ We will return to this evidence in the paper's discussion section.

Finally some have argued against the notion that there is anything consistently different about Moslem's desire for children or their receptivity to contraceptive use (see, for example, Weeks, 1988). Instead, they argue, group differences can be traced to characteristics associated with being Moslem, such as greater poverty or living in less economically developed communities. We explore a number of these "characteristics" hypotheses in the analyses that follow.

Data

As noted earlier, we collected our data so that it would be comparable to data collected in the Status of Women and Fertility (SWAF) study. Karen Mason and Herb Smith designed and organized SWAF; their principal collaborators were Napaporn Chayovan (Thailand), Shireen Jejeebhoy (India), Shyamala Nagaraj (Malaysia), Corazon Raymundo (Philippines), and Zeba Sathar (Pakistan). The SWAF study was designed to examine the links between patriarchal institutions, women's autonomy/power and fertility/family behavior. The primary mode of data collection was sample surveys, and the country investigators matched the survey content as closely as possible to allow cross-country comparisons.

These surveys were not designed to be representative samples of the respective countries or any specific region/group within these countries. Instead the goal was to select village/community settings with sharply contrasting sociocultural systems. Country investigators selected representative samples of households, and married women and their husbands from these places. This strategy maximizes variation in sociocultural setting so that the effects of this variation in "setting" or "context" could be tested. The available data across diverse settings, both within and across countries, provides an opportunity to test the robustness of the association and to examine possible sources of variability. The

inferential power comes from an exploration of the association across diverse settings, not from generalizations to the population from which the sample was drawn.

We collected our data in early 1997 in Sunsari District (the eastern plains, or Terai). We chose three religious/ethnic groups: 1) Moslem, 2) Mahato, and 3) Tharu. We collected data in eight locations. We attempted to interview roughly 100 married women from each religious/ethnic group in three different communities. Table 1 shows the number of wives interviewed by research site. These married women provide all data analyzed in this paper.

As noted earlier, Mahatos and Tharus consider themselves to be Hindu. These ethnic groups were chosen for comparison, and we expected from the outset that wives in these communities would have relatively high power/autonomy compared to Moslem wives. Our central aim is to explore the consequences of such differential levels of power and autonomy. To further facilitate comparison, these settings were chosen to minimize differences on other community characteristics.

Table 1 Study sites and sample sizes for wives

Religious/Ethnic Group and Location	Number of Wives Interviewed
Moslem	334
Devangunj	122
Bhutaha	108
Bhokraha	104
Mahato	345
Kaptangunj	121
Devangunj	141
Inaruwa	83
Tharu	313
Dumraha	123
Shivanagar	(190)
Sainimeini	(190)

The overwhelming factor that these areas have in common is pervasive poverty. As a result women perform such activities as selling goods at the local market, working for wages and participating in both agriculture and brick industries. A second unifying characteristic of these ethnic groups is that all of them practice *purdah*, or female seclusion. Although, at first glance, this may seem counter to our selection criteria (i.e., to choose communities where women's position varied substantially), the practice of *purdah* varies considerably across these

religious/ethnic groups. There is also variation in the extent to which *purdah* is practiced within religious/ethnic groups, by community and by household wealth.

As our data demonstrate, despite variation in the practice of *purdah*, Moslem wives do have more restrictions placed upon their freedom of movement. However, it is only within the wealthiest compounds that wives remain secluded within their compounds. The spatial orientation of households in these villages is also related to the practice of *purdah*. In every village houses are constructed around an inner square. Additional walls offer greater seclusion to the inner courtyard, especially in Moslem clusters. Additional similarities in these villages include the lack of electricity and running water. Other forms of community infrastructure, i.e., the presence and staffing of schools, health posts and agricultural extension services, are fairly consistent across communities.

Analysis

Our analytic strategy is the classic "elaboration model." We begin by establishing that an association exists between religion/ethnicity and relevant fertility measures. Table 2 shows the percent pregnant, the percent who want more children, and the percent at risk of an unwanted pregnancy stratified by religion/ethnicity. We predicted that Moslem wives would desire more children and, if they wanted no more children, would nevertheless be less likely to use contraception. This association is readily apparent: 37.5 percent of Moslem wives want more children compared to 24.6 percent and 22.5 percent for Mahato and Tharu wives. Women are considered to be at risk of an unwanted birth if they are not currently pregnant, they say that they do not desire any additional children, and they are not currently using a method of family planning. Clear differences emerge that confirm our expectations. Nearly 70 percent of Moslem wives were at risk of an unwanted pregnancy compared to 30.6 percent and 41.6 percent of Mahato and Tharu wives.

In additional analyses, we will attempt to explain these differences in the desire for children, and the risk of unwanted births by taking into account measures of women's power/autonomy. If variation in wives' power/ autonomy mediates or "explains" these associations then statistical controls on wives power/autonomy will attenuate the original association (between religion/ethnicity and fertility measures). In effect, once the level of power/autonomy is taken into account statistically, we expect evidence of a weaker association between religion and the fertility

Table 2 Percent pregnant, percent wanting more children, and the percent at risk of an unwanted pregnancy: By religion/ethnicity

Religion/Ethnicity	Percent pregnant	Percent want more children	Percent at risk of unwanted pregnancy
Mahato	8.1	24.6	30.6
(N)	(345)	(317)	(229)
Moslem	12.3	37.5	69.6
(N)	(334)	(293)	(168)
Tharu	6.1	22.5	41.6
(N)	(313)	(294)	(209)
Chi-square (df)	8.2 (2)	19.5 (2)	61.4 (2)
P	p=.017	p=.000	p=.000

outcomes. In order for power/autonomy to have such an effect 1) power/autonomy must vary substantially by religion/ethnicity, and 2) power/autonomy must be associated with the fertility outcomes.

We now turn to the first question: Does power/autonomy vary by religion and ethnicity? As noted earlier, we consider four aspects of wives' autonomy: freedom of movement, economic power, economic autonomy, and measures of coercion by their husbands. Tables 3-6 show differences across these three ethnic groups on these measures. Results show that, as expected, Moslem wives tend to score lower on these dimensions of power/autonomy than do Mahato and Tharu wives. We will now briefly consider each measure of women's power/autonomy.

Our survey included a set of questions asking where wives could "go alone".⁵ Given the sharp and consistent religious/ethnic differences across these items, and consistent with our expectation based on earlier work (Niraula and Morgan, 1996), we have constructed a simple additive scale for freedom of movement. Specifically we combine responses to questions regarding traveling to the market, the health post, and the next village. The distribution for this scale measure is shown by religion/ethnicity in Table 3. Thirty-four percent of Moslem wives can go to at most only one of the three places considered, as compared to 13 and 18 percent of Tharu and Mahato women, respectively. Judging from this index, Tharu and Mahato women have comparable levels of freedom of movement while Moslems score much lower.

Table 4 shows responses to questions intended to measure wives' economic power. The first question asks whether wives have a say in how the overall household income is spent; the second question asks whether the respondent would be able to support herself without her husband.

Table 3 Freedom of movement index (i.e., sum of "yes" responses to "can go alone to" the market, the health post and the next village) by ethnicity/religion

Index Score	Mahato	Moslem	Tharu
0	7.8	23.7	10.6
1	4.9	10.5	7.1
2	60.9	47.8	39.4
3	26.4	18.0	43.0
Total	100.0	100.0	100.0
N	345	333	312

Chi square 93.0 (6 df), $p=.000$

Both items vary significantly across religious/ethnic groups. Most wives, regardless of group, claim a say in how household income is spent. But Moslem wives are less likely to make such a claim compared to the other groups. To the second item, Mahato and Moslem wives are much less likely to say that they could support themselves compared to Tharu wives.

Table 4 Percent responding "yes" to questions regarding women's economic power by ethnicity/religion

Item	Mahato	Moslem	Tharu	Chi-square (df) and p
Say in household income (N)	93.6 (345)	87.1 (334)	92.7 (313)	10.2 (2); $p=.006$
Support self (N)	69.3 (345)	66.9 (332)	83.8 (309)	27.1 (2); $p=.000$

In subsequent analyses we use the first item because responses to this item are more likely based on actual behavior or experience. Informal interviews with wives in this area indicated that they had difficulty responding to hypothetical questions such as "in the absence of your husband, could you..."

Our data include responses to questions regarding wives' ability to purchase certain items on their own; presumably, these items capture an aspect of wives' economic autonomy. Table 5 shows the index of economic autonomy that we use in subsequent analyses. Responses to questions regarding the purchase of saris, spices, and utensils compose this additive index.⁶ As shown, Tharu wives have the highest level of economic autonomy, followed by Mahato wives, and then by Moslem wives.

Table 5 Index of economic autonomy (i.e., sum of "yes" responses to questions regarding buying sari, spices and utensils) by ethnicity/religion

Economic Autonomy Index	Mahato	Moslem	Tharu
0	54.0	71.2	47.3
1	13.2	10.1	14.2
2	12.3	12.0	13.5
3	20.5	6.8	25.1
Total	100.0	100.0	100.0
N	341	326	311

Chi square 53.3 (6 df); $p=.000$

Table 6 shows differences among the ethnic/religious groups in responses to questions about coercive relations with husbands. The groups do not differ significantly in the likelihood of stating that they are "afraid to disagree with their husbands". However, differences are found in responses to the question asking if the husband "beats the wife"; Moslem wives are significantly more likely to report that they have been beaten by their husbands.⁷

In summary, Moslem wives have substantially less power/autonomy than do Mahato and Tharu wives. Available information suggested that this would be the case prior to our work, and it was for these reasons that we chose these particular groups. We are now well-positioned to address

Table 6. Percent responding "yes" to questions regarding women being "beat by husband" by ethnicity/religion

Item	Mahato	Moslem	Tharu	Chi-square (df) and p
Afraid to disagree with husband (N)	33.0 (333)	31.7 (312)	30.2 (291)	0.6 (2); $p=.74$
Husband beats wife (N)	31.1 (338)	42.3 (312)	13.6 (294)	60.9 (2); $p=.000$

the central question of this analysis: Are differences in women's power/autonomy sufficient to account for differences between Moslems and non-Moslems in their fertility behavior? In subsequent sections of this paper, we will present multivariate analyses designed to address this question.

Before turning to those analyses, we discuss briefly additional variables that may contribute to the bivariate association between religion/ethnicity and the fertility variables. Table 7 presents evidence

regarding a range of variables that have previously been demonstrated to affect fertility behavior, and that could potentially vary systematically across the three groups considered.

Our analysis shows that Moslem wives have less education, lower household income and live in households with fewer material possessions than wives in the other groups.⁸ Low education and greater poverty are frequently correlated with fertility variables.

We also consider two measures of family and household structure. Basu (1992) suggests that wives who are married to household heads, and who are therefore afforded higher status, will act more autonomously than other daughters-in-law, resulting in their greater ability to implement their reproductive choices, including their desire to limit childbearing. Previous research (Dyson and Moore, 1983) also suggests that, due to more favorable norms and/or greater support from natal homes, wives whose husbands are relatives may have greater power/autonomy, also resulting in their greater ability to implement their reproductive choices.

Table 7 Distributions on selected factors by ethnicity/religious differences

Selected Factors	Mahato	Moslem	Tharu
Education			
No formal schooling	82.3	93.1	85.9
1-4 years	3.5	3.3	4.8
5+ years	14.2	3.6	9.3
Family wealth/SES			
Low income	35.8	38.9	24.8
Mid income	26.2	34.7	39.9
High income	38.1	26.4	35.4
Possession index mean	1.4	1.0	1.2
Previous fertility (children ever born)			
0	8	10	5
1	11	11	16
2	13	14	21
3	21	14	21
4	17	10	16
5	15	11	12
6	9	11	5
7-13	7	18	4
Mean surviving			
Boys	1.6	1.7	1.5
Girls	1.5	1.6	1.4
Family/household structure			
Wife of household head	63.5	56.9	62.3
Wife and husband related	0.6	16.3	0.3

Finally, we control on number of surviving children to ensure that the greater demand for additional children or lower levels of contraceptive use did not result from Moslem's lower fertility (or higher infant mortality) to date. This is clearly not the case, Moslem wives have higher mean numbers of surviving children (both sons and daughters). In the analysis that follows we represent surviving children by a linear scoring of the number of sons and daughters, and by additional contrasts for those with two or more sons and for those with at least one daughter.

Table 8 shows the key findings with respect to the desire for more children. The first column shows the bivariate association. Moslems are 2.08 times more likely to desire more children than are Tharu wives;

Table 8 Effects (odds ratios) of ethnicity/religion on desire for more children: Control on potential intervening variables

Selected Factors	Model (1)	Model (2)	Model (3)
Ethnicity/religion			
Moslem/Tharu	2.08**	4.39**	6.55**
Mahato/Tharu	1.12	2.01*	2.25**
Age of woman			
(Age-28)		.98	.97
(Age-28) squared		1.00	1.00
Education			
Years (1-4/0)		.58	.70
Years (5/0)		1.22	1.13
Family/household structure			
Eligible respondent/wife		.98	.86
Eligible respondent and husband related		1.32	.95
Number of sons/daughters			
Number of sons		.14**	.14**
At least two sons		.66	.53
Number of daughters		.56**	.53**
At least one daughter		.24**	.23**
Family income/wealth			
Middle/low income		1.53	1.32
High/low income		1.54	1.16
Household possessions		.85	1.12
Freedom of movement index			.99
Economic power "Say in income"			1.26
Economic autonomy index			.98
Coercion "Husband beats wife"			.72
Constant	3.46**	11.7**	14.3**
Log likelihood	-527.34	-254.03	-229.51
N	904	856	799

*significant at .05; **significant at .01.

the difference between Mahato and Tharu (a factor of 1.12) is small and not statistically significant. Model 2 introduces controls for age, education, income, and previous fertility. Despite strong effects of previous fertility, these controls actually increase the religion/ethnic differential, rather than attenuate it. Net of these factors Moslems are estimated to be 4.39 times more likely to desire additional children than are Tharu wives. A Mahato/ Tharu difference emerges with these controls; Mahato wives are 2.01 times more likely to want another child than are Tharu wives.

Model 3 tests the central expectation of this analysis, i.e., once group differences in wives' power/autonomy are controlled, the religion/

Table 9 Effects (odds ratios) of ethnicity/religion on being at risk of an unwanted pregnancy: Controls on selected variables

Selected Factors	Model (1)	Model (2)	Model (3)
Ethnicity/religion			
Moslem/Tharu	3.21	3.16**	3.09**
Mahato/Tharu	.61	.63*	.57*
Age of woman			
(Age-28)		1.00	.99
(Age-28) squared		1.00	1.00
Education			
Years (1-4/0)		1.02	1.01
Years (5/0)		1.70	1.49
Family household structure			
Eligible respondent/wife		.76	.64*
Eligible respondent and husband related		.76	1.22
Number of sons/daughters			
Number of sons		1.42**	1.42**
At least two sons		.37**	.38**
Number of daughters		1.21*	1.24*
At least one daughter		.63	.63
Family income/wealth			
Middle/low income		1.08	.97
High/low income		.90	.86
Household possessions		.97	1.00
Freedom of movement index			1.40**
Economic power "Say in income"			2.33*
Economic autonomy index			.94
Coercion "Husband abuses wife"			1.17
Constant	.7	.74	5.4**
Log likelihood	-386.0	-353.32	-333.47
N	606	571	549

*significant at .05; **significant at .01

ethnicity association (with the desire for more children) will weaken. Model 3 simultaneously includes all four dimensions of women's power/autonomy. These variables do not attenuate the association because they are not strongly associated with the desire for more children, and none of the associations achieve statistical significance. Thus, Model 3 does not provide evidence that women's greater power/autonomy reduces their demand for children; therefore, it provides no evidence that power/autonomy mediates the association between religion/ethnicity and women's desire for additional children. Regardless of women's individual level of power/autonomy, Moslem women demonstrate a greater desire for children than Hindu women, from either ethnic group.

Table 9 allows tests that closely parallel the ones above. This second analysis tests whether differences in power/autonomy explain the higher likelihood that Moslem wives are at risk of an unwanted pregnancy (compared to the non-Moslem groups). As in the previous table, Model 1 shows the bivariate association, Moslem wives are 3.22 times more likely to be at risk than are Tharu wives; Mahato wives are least likely (.62 as likely as Tharu wives). Neither the control variables added in model 2, or the measures of power/autonomy added in model 3, attenuate the association of religion/ethnicity to the risk of an unwanted pregnancy. Note that several of the power/autonomy measures have significant effects, but these effects are inexplicably positive.⁹ Clearly, there is no evidence here that power/ autonomy *reduces* the risk of an unwanted pregnancy.

Discussion and Conclusion

The contrasts of Moslems, Tharus and Mahatos in eastern Nepal do show that Moslem wives have less power/autonomy than do those in other groups. But counter to our primary hypothesis, these power/autonomy differences cannot explain religious/ethnic differences in the demand for children or in the risk of an unwanted pregnancy. These results are very similar to those from the SWAF data for India, Malaysia, the Philippines, and Thailand (Morgan et al., 1998). Together these results confirm a consistent Moslem/non-Moslem difference on these fertility variables, but they leave open the question of what accounts for these differences.

As noted earlier, Morgan et al. (1998: 23-24) offer a post-hoc explanation: "Political opposition to Islam, on global and local scales, and social change accompanying development engender a preoccupation

with Islamic identity that strengthens patriarchal ideology. ... Reaffirmation of Islam and the resultant preoccupation with cultural identity may foster pronatalism that—although not exclusive to the Islamic religion—is germane to contemporary Moslems' experience in (South Asia). Such a Moslem community response could generate and sustain pervasive differences in fertility norms and in behavior, resulting in observable differences in fertility levels."

This argument resonates with some observations made in our study sites. Specifically, Moslems in these communities hold the opinion that Hindu and Buddhist majority groups are not supportive of Moslem ideas, beliefs, and needs (Neidell, fieldwork, 1997). A common response in the survey area is that "they won't even fund our schools." Such group animosity may lead Moslems to disregard messages regarding family planning, as an arm of the "Hindu" state, and indeed Nepal is the only self-proclaimed Hindu Kingdom in the world. Family planning activities may be viewed as a directive emanating from majority religious/ethnic groups, and suited to their own desire to perpetuate political and social dominance. In other words, fieldwork suggests that Moslems view family planning programs as an attempt for Hindu/Buddhist majority groups to regulate even the most central aspects of their family life. Resistance to this form of social influence is the likely outcome.

Routinized resistance to use family planning services can further function as a marker of group identity. These behaviors can become routinized in village communities because the use of family planning services easily becomes common knowledge within tightly knit social networks. This may be especially true because the majority of contraceptive use in Nepal consists of permanent sterilizations, that require surgery and recuperation, and that are typically provided through mobile camps and in some fixed-site clinics in major centers. High visibility allows for strong community sanctions and, therefore, strong community social control. Moreover, surreptitious use becomes unlikely. The family planning clinic—and its non-Moslem health workers—become symbols of "them"; daily nonuse reaffirms "us", and a distinctive group identity. Several Moslem leaders in these communities clearly stated that the family planning emphasis of the health posts was an unwarranted and unnecessary intrusion in their community. Our discussions of family planning issues with Moslem community leaders were often uncomfortable and markedly strained. (Also see Jeffery and Jeffery, 1997: 242-243).

To the extent that our survey was considered an “arm of the state”, the dynamics discussed above could exaggerate the differences we observed. One Moslem respondent told Neidell (field notes) that she would like to be sterilized, but in order to do this she would need to return to her natal home in Biratnagar, a sizeable city. The anonymity of the city, and its distance from her current residence, permitted her greater privacy. This example reminds us that Moslems can demonstrate solidarity by making pronatalist statements to outsiders. In other words, there is some reason to suspect that Moslems may under report the use of contraceptives.

As an addendum, from the outset we expected that Tharu people, as an ethnic group whose recent experiences have left them external to and mistrustful of the state, might similarly resist antinatalist government interventions. The evidence presented in this analysis suggests that, on average, the fertility behavior of Tharus differs little from that of Mahato people. However, these two ethnic groups share important similarities, that lend commonality to their experiences, and that distance both groups from majority political, social and economic structures. In addition to their joint practice of Hinduism, Mahatos and Tharus are both indigenous Terai ethnic groups – groups that remain largely external to the high caste Hindu ethnic groups that exert considerable influence in Nepalese government and other aspects of social life.¹⁰

In conclusion, we would like to make three points: First, our demonstration that religion/ethnicity strongly influences fertility will be interpreted by some as a suggestion that Moslem fertility will not fall or will always be higher than that of non-Moslems. Such an interpretation rests on outdated notions of culture as static, or at least highly resistant to change. Obermeyer (1994a, 1994b) argues strongly that Islam is open to various interpretations regarding the roles of women and the acceptability of contraception. The dominant Moslem position on these issues is not immutable; thus, neither are the pronatalist effects we suggest. Secondly, while similar, Moslem communities in this study are different in some respects. Specifically, Moslem fertility and Moslem wives' autonomy/power are not identical across all communities. This fact, not exploited in the current paper, reinforces our first point, allowing for community specific dynamics that could account for these differences. We will explore these differences more thoroughly in subsequent work. Finally, our study has a practical lesson. We argue that the higher risk of unwanted pregnancy is not the result of Islam *per se*, but the result of unfavorable inter-group dynamics, routed in a more fundamental social

discord. It is an unfortunate reality that those who provide services to this and other minority populations in this diverse country will have to come to grips with the suspicions of their client populations if they are to effectively meet their needs. We recognize that this is not an easy task.

Notes

- 1 Sterilization might be considered an exception. Direct injunctions, fatwas, against sterilization have been issued by Islamic jurists but opposition to sterilization is not unanimous.
- 2 During the later half of the twentieth century, Tharus throughout the Terai lost the majority of their traditional lands to migrants from the north. This migration occurred as a result of planned economic development strategies that promoted the resettlement of the Terai by migrants from the more densely populated, and less agriculturally productive hill areas (Guneratne, 1996).
Tharus posed little threat to these government resettlement programs, and they were divested of the major portion of their land-holdings in short order. Indebtedness has been posited to be the principal factor explaining the decline of land-ownership among the Tharu, although alcoholism and gambling were also contributing factors (Guneratne, 1996).
- 3 Bhanu Niraula's familiarity with the area and his preliminary fieldwork suggested the Mahato as an appropriate comparison group.
- 4 Shara Neidell has conducted intensive fieldwork in both Moslem and non-Moslem fieldsites.
- 5 In addition to the three items included in the scale, women were asked if they could go alone to: fields outside the village, public place, visit a friend, a temple, the cinema, a bank, or a club.
- 6 Other items in the set, but not included in the index, were: food grains, clothes, sandals, and jewelry. Only one item in this set failed to show greater economic autonomy for non-Moslem wives. This exception is "buying jewelry" – Moslem wives are much more likely to say that they can purchase jewelry. This item is a "special case" because 1) Moslem women sell glass bangles at the weekly markets; these inexpensive glass bangles could be interpreted as jewelry. 2) Moslem women tend to wear silver bracelets (rather than gold) making their purchase less important.
- 7 This result certainly deserves more study. Comparisons of Moslems and non-Moslems using the SWAF data did not provide any evidence of greater physical coercion among Moslems.
- 8 Education is measured from a report of years of schooling completed. Household income is calculated by summing income from all sources; this variable is used to create three contrasts (low, medium and high). The possession index is a sum of specific consumer items found in the household.

- 9 We have not explored possible reasons for this unexpected result. We will do so in subsequent work.
- 10 Resettlement programs to the Terai encouraged the migration of hill people from both high caste and hill ethnic groups. However, in part because government settlement programs in the Terai have historically favored high caste groups with grants of more productive land, high caste Brahmins and Chhetris constitute a socioeconomically advantaged group in much of the Terai today. Hill ethnic migrants occupy a middle strata of Terai society, owning land in many parts of the Terai, but occupying fewer positions of social, political and economic leadership than do high caste people. Indigenous populations remain among the least advantaged sectors of Terai society in contemporary Nepal (Ghimire, 1992; Seddon, 1987; Stash, 1997).

References

- Acharya, Meena and Lynn Bennett. 1981. *The Status of Women in Nepal*. Rural Women of Nepal: An Aggregate Analysis and Summary of Eight Village Studies. Vol 2. Part 9. Kathmandu: Center for Economic Development and Administration, Tribhuvan University.
- Basu, Alaka M. 1992. *Culture, the Status of Women and Demographic Behavior*. Oxford: Clarendon Press.
- Cain, Mead. 1984. "Women's status and fertility in developing countries: Son preference and economic security." *Working Paper* No. 110. New York: The Population Council, Center for Policy Studies.
- Cain, Mead, Syeda Rokeya Khanam, and Shamsun Nahar. 1979. "Class, patriarchy and women's work in rural Bangladesh." *Population and Development Review* 5: 405-438.
- Caldwell, John C. 1986. "Routes to low mortality in poor countries." *Population and Development Review* 12: 171-220.
- CBS. 1993. *Statistical Yearbook of Nepal 1993*. Kathmandu: Central Bureau of Statistics (CBS).
- Day, Lincoln H. 1968. "Natality and ethnocentrism: Some relationships suggested by an analysis of Catholic-Protestant differentials." *Population Studies* 22: 27-50.
- Dyson T. and M. Moore. 1983. "On kinship structure, female autonomy and demographic behavior in India." *Population and Development Review* 9: 35-60.
- Ghimire, Krishna. 1992. *Forest or Farm? The Politics of Poverty and Land Hunger in Nepal*. Delhi: Oxford University Press.
- Goldscheider, Calvin and Peter R. Uhlenberg. 1968. "Minority group status and fertility." *American Journal of Sociology* 74: 361-372.
- Guneratne, Arjun. 1996. The tax man cometh: The impact of revenue collection on subsistence strategies in Chitwan Tharu society." *Studies in Nepali History and Society* 1: 5-35.

- Jeffery, Roger and Patricia Jeffery. 1997. *Population, Gender and Politics*. Cambridge: Cambridge University Press.
- Kirk, Dudley. 1968. "Factors affecting Moslem natality." In *Population and Society*. Ed. Charles B. Nam. Boston: Houghton Mifflin.
- Mason, Karen Oppenheim, S. Philip Morgan, and Herbert L. Smith. 1997. "Moslem women in non-Islamic countries of Asia: Do they have less autonomy than their non-Moslem neighbors?" Draft manuscript.
- Moghadam, V. 1992. "Patriarchy and the politics of gender in modernizing societies undergoing development and social change: Iran, Pakistan and Afghanistan." *International Sociology* 7: 35-53.
- Morgan, S. Philip and Bhanu B. Niraula. 1995. "Gender inequality and fertility in two Nepal villages." *Population and Development Review* 21: 541-561.
- Morgan, S. Philip, Sharon Stash, Karen Mason, and Herbert Smith. 1998. "Religious differences in the desire for children and in contraceptive use: Moslem and non-Moslem differences in India, Malaysia, Thailand and the Philippines." Paper presented at the 1998 meeting of the Population Association of America, April 2-4, Chicago, IL.
- NIV. 1993. *Nepal Fertility and Family Planning and Health Survey 1991: Main Report*. Kathmandu: New ERA, IIDS, and Valley Research Group (NIV) Joint Ventures.
- Niraula, Bhanu B. and S. Philip Morgan. 1996. "Marriage formation, post-marital contact with natal kin and the autonomy of women: Evidence from two Nepali settings." *Population Studies* 50: 35-50.
- Obermeyer, Carla M. 1994a. "Reproductive choice in Islam: Gender and State in Iran and Tunisia." *Studies in Family Planning* 25: 41-51.
- Obermeyer, Carla M. 1994b. "Religious doctrine, state ideology, and reproductive options in Islam." In *Power and Decision: The Social Control of Reproduction*. Eds. Gita Sen and Rachel C. Snow. Cambridge, MA: Harvard University, Center for Population and Development Studies.
- Seddon, David. 1987. *Nepal: A State of Poverty*. New Delhi: Vikas Publishing House.
- Stash, Sharon. 1997. "The dynamics of fertility decision-making among wives and their husbands in Chitwan, Nepal." Ph.D. dissertation. Ann Arbor, MI: University of Michigan.
- Weeks, John R. 1988. "The demography of Islamic nations." *Population Bulletin* Vol. 43, No. 4. Washington, DC: Population Reference Bureau.

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Socioeconomic Changes, Women's Autonomy, and Timing of First Birth in a Semi-Urban Community in Nepal

Devendra P. Shrestha

Introduction

Previous studies have shown the influence of social transformations such as urbanization, education and income on the first birth interval (Thorton and Fricke, 1989; Tsuya and Choe, 1994). These researchers have argued that such social transformations provide more autonomy to young boys and girls in the mate selection process. These changes could facilitate quicker intimacy among couples. Linking conjugal intimacy to coital frequency through romantic marriage, Rindfuss and Morgan (1983) argued that in the case of romantic marriage (woman choosing her own spouse) the relationship between husband and wife will be very intimate resulting in a higher level of coital frequency and thus greater risk of an early first birth. They termed it as the "quiet revolution" in Asia. Fricke and Teachman (1993) showed further evidence of a decline in first birth interval among Tamangs residing in the high mountains in central Nepal and attributed this decline to marriage and cultural factors. Previous studies have also demonstrated the importance of ethnicity factors on the timing of

marriage and the timing of first birth (Hirschman, 1985; Rindfuss et al., 1983; Thapa, 1989 and 1997; Fricke and Teachman, 1993).

In this paper I attempt to broaden the understanding of the dynamics of the first birth interval. Using micro-demographic data gathered from a single ethnic group, the Newars of Kirtipur in the Kathmandu Valley, this paper examines the influence of family and individual experience variables on the timing of the first birth in the context of social transformation. More specifically, the paper focuses on: (i) the overall pattern of first birth intervals, (ii) the trends in first birth intervals across birth cohorts and marriage cohorts, and (iii) determinants of the observed patterns and trends of the birth intervals.

Sociodemographic and Cultural Factors: Theoretical Expectations

Age at marriage, respondent's education, opportunities for employment in the formal sector, respondent's outside exposure, pattern of mate selection and marriage cohort are all likely to influence the timing of first birth. The causal mechanism of each factor is described below.

Age at Marriage

Various studies have revealed that age at marriage has a very strong direct effect on length of the first birth interval (Hirschman 1985; Kallan and Udry 1986; Fricke and Teachman 1993). Women who marry late tend to have their first child sooner after marriage than young brides. This may be due partly to the increased fecundity of brides and grooms and to the catch-up effect of marrying later (Chen and Morgan, 1991; Yang and Feng, 1994). Rindfuss and Morgan (1983: 263) noted that, "As age at marriage increases to a woman's early 20s her early married years coincide with her most fecund period."

Education

Education is another important factor that explains the variation in the first birth interval (Rindfuss et al., 1980; Hirschman, 1985; Kasarda et al., 1986; Kravdal, 1994). Education affects fecundity through better health and nutrition and lower prevalence of disease. Fetal loss rates are also likely to be lower for more educated women. Furthermore, coital frequency varies with education (Kallan and Udry, 1986). Hirschman (1985: 38) observed: "Changes in aspirations, a shift

towards autonomy in the choice of a marriage partner, and a desire for some period of independence before settling down are some of the possible consequences of education on the timing of family formation." More educated women tend to choose their own spouses due to exposure and interactions during their educational attainment; this results in quicker intimacy, more frequent coitus and less waiting time to first birth.

Marriage Cohort

A cohort refers to a group of people experiencing a particular event during the same period of time. Since the effects of any event vary with women's age, the meaning and significance of such events might differ among marriage cohorts. Ryder (1965) argues that generational change is likely to be dependent upon successive cohorts being exposed to new influences and opportunities. Furthermore, the environment in which women are socialized might differ across marriage cohorts. This changing social environment may lead to differences in the occurrence of events. One may expect changes in behavior across marriage cohorts of women to be due to changes in the socioeconomic environment of society over time. New social transformations would significantly influence the younger cohort. Thus, the younger marriage cohort is expected to have shorter intervals to first birth.

Outside Exposure Before Marriage

Outside exposure before marriage is a factor associated with autonomous choice of a spouse. If women have lived outside their native home for more than one month, it may be hypothesized that they will have increased participation in the mate selection process. The greater their outside exposure before marriage, the more autonomous they will be in the choice of their spouse. This autonomy may lead to quick intimacy among couples and hence shorter intervals to first birth.

Father's Work Experience

Parental characteristics, such as a father's participation in wage labor before his daughter's marriage is often associated with autonomous choice of spouse (Fricke and Teachman, 1993). If the father is involved in wage labor he is more likely to recognize the importance of his daughter's opinion in the selection of her marriage partner.

Contraception

Previous studies have indicated that Nepali women are likely to use contraception to limit births only when they attain their desired family size, with at least one surviving son (Acharya, 1998; Tuladhar, 1989). In 1981 only 0.3 percent of currently married women with no living children were using contraception (Tuladhar, 1989). Negligible use of contraception prior to first birth in Nepal is governed by a strong value system. Childbearing is essential for a woman to obtain social status and to prove herself fertile, as well as to continue the paternal lineage. The mother-in-law constantly pressures the newlywed couple to have a child. The women of the household, especially the mother-in-law, will be watching for any sign of pregnancy (Bennett, 1976).

A first birth also reduces the anxiety of possible remarriage by the husband, no matter who is responsible for childlessness. A childless woman is pitied and looked down upon by society (Tuladhar, 1989; Niraula and Morgan, 1996). In view of these social values contraception is rarely practiced to delay a first birth. In a society in which premarital sex remains a socially unacceptable practice, contraception and premarital conception are of little significance in explaining variation in the first birth interval.

The Study Community

Individual and family behavior are influenced by the socioeconomic conditions that surround them. In this section I briefly describe the social transformation of Kirtipur and link this to the changing pattern of the first birth interval. Chithubihar Village Development Committee (VDC), one of the VDCs of Kirtipur, a semi-urban location, is the study area. Since the study area is widely known as Kirtipur, I will hereafter refer to this area as Kirtipur.

According to the population census of 1991 this settlement consists of 805 households, with a total population of 4,538. The inhabitants are mainly Newars with few from other ethnic communities. Thus, this is a homogenous group with respect to norms and values regarding social practices. Until recently, agriculture was the major occupation in Kirtipur; about 90 percent of residents were involved in agriculture. In recent years a shift to industrial and service sectors has taken place. The proximity to Kathmandu, the capital city, and to Patan, another local town, has provided opportunities for alternative jobs.

One remarkable change is in the field of education. Access to education has increased sharply due to the rise in the number of schools. Furthermore, the traditional practice of not sending girls to school has been abandoned almost altogether, leading to an increase in female literacy.

In Kirtipur, the family system is also undergoing changes. The traditional joint family system is gradually giving way to the nuclear family. Furthermore, while marriage arranged by parents and/or seniors continues to be the most common practice, marriage by one's own choice is in practice. In essence, marriage has shifted from parental arrangement to joint decision making between parents and children; children have gained autonomy in the choice of marriage partners. The opinions of both sons and daughters are sought and thus, this can be treated as a step toward women's autonomy. Once the marriage alliance is finalized, boys and girls are allowed to meet freely with each other. Elopement is also practiced; during the survey 18 cases of elopement were recorded.

In Kirtipur, ownership of consumer durables was almost non-existent a few years ago. In recent years the pace of acquisition has increased rapidly so that now most households own a radio/recorder and/or television. Thus, people are exposed to modern communication systems and entertainment media. As a result the lifestyle of the people in Kirtipur has undergone changes. Furthermore, non-governmental organizations are active in launching and supporting development projects in the area. One program is the establishment of a child care center, a move which facilitates women's involvement in income generating activities. These various socioeconomic transformations combined with the social context of marriage are expected to influence the timing of the transition to motherhood in the study community.

Data

The data for the present micro-demographic study come from a retrospective survey of Kirtipur undertaken during the months of October and November, 1993. In-depth interviews of selected cases were also conducted and supplemental information was gathered through informal conversations with the village head.

The 1990 voters' list prepared by the National Election Commission for Nepal's General Election was used to randomly select 200 households (out of a total 805) from all nine wards. Information on education, work, residence, outside exposure, child bearing, parents'

backgrounds and the timing of these experiences was collected using a structured questionnaire. All female residents 12 years of age and above were interviewed. This yielded 487 women, both married and never married.

In this paper, analyses are confined to 301 ever-married women because, as previously stated, there is little premarital sex or physical intimacy of any kind between boys and girls (Thapa, 1989; Dahal, 1993); and, in the event of premarital pregnancy, marriages are negotiated quickly (Fricke and Teachman, 1993). The analysis will be confined to only the first birth interval as factors associated with birth intervals vary by birth order (Rindfuss et al., 1989).

Over 90 percent of Kirtipur residents speak only Newari language, their mother tongue (which is different from the national language, Nepali). The interviews were, therefore, conducted by experienced and qualified Newari interviewers. This, combined with careful supervision, helps to ensure the quality of the data.

In order to gather quality data the interviewers were instructed to check the consistency of data and to cross examine if found inconsistent. Repeated visits were made to clarify the inconsistencies and to make necessary corrections. Moreover, important social events were used as reference points to aid in the recollection of personal events. Recalling the dates of events in this manner reduces the chances for error.

Since the data come from retrospective accounts of marriage and first births, events which may be afflicted by recall lapse, there could be some concern regarding the quality of the data. Measurement error in data could be due to forward displacement of first birth date, backward displacement of marriage date and omission of early births that died (Kallan and Udry, 1986). I assume measurement errors are distributed randomly across the analytical groups of interest within this fairly homogenous population and that this does not systematically affect these analyses (Fricke and Teachman, 1993; Rindfuss and Morgan, 1983).

Results

Age at Marriage and Age at First Birth

Table 1 shows mean age at first marriage, mean age at first birth, and the absolute difference between these two ages. On average, women in Kirtipur marry at 18.44 years of age. Cohort comparisons

reveal a significant rise in the average age at marriage from 16.16 among the eldest cohort to 19.46 among the youngest cohort. (For the cohort 1970-79, age at marriage needs to be carefully interpreted due to age at marriage truncation bias).

Table 1 Mean age at marriage (AFM) and age at first birth by birth (AFB) cohort, Kirtipur, 1993

Birth Cohort	Mean Age at First Marriage	Mean Age at First Birth	Absolute Difference between AFM and AFB
1970-1979	18.21	19.07	1.13
1960-1969	19.46	20.92	1.46
1950-1959	19.10	21.38	2.28
1949-1949	19.07	21.29	2.22
1930-1939	17.89	21.30	3.41
<1930	16.16	19.57	3.41

The first birth interval—the interval between marriage and the first child—is 16 months. Thus, the average age at first birth is approximately 19.8 years. Table 1 shows a trend toward shorter intervals; the average first birth interval ranged from 1.46 years for the youngest cohort to 3.41 years for the eldest cohort.

Table 2 presents the monthly probability of an ever-married women giving birth to a first child by duration of marriage and by marriage cohort. These values are plotted in Figure 1. The monthly probabilities were obtained using the life table procedure. As the data

Table 2 Life table results for first live birth after marriage by duration of marriage and marriage cohort, Kirtipur, 1993

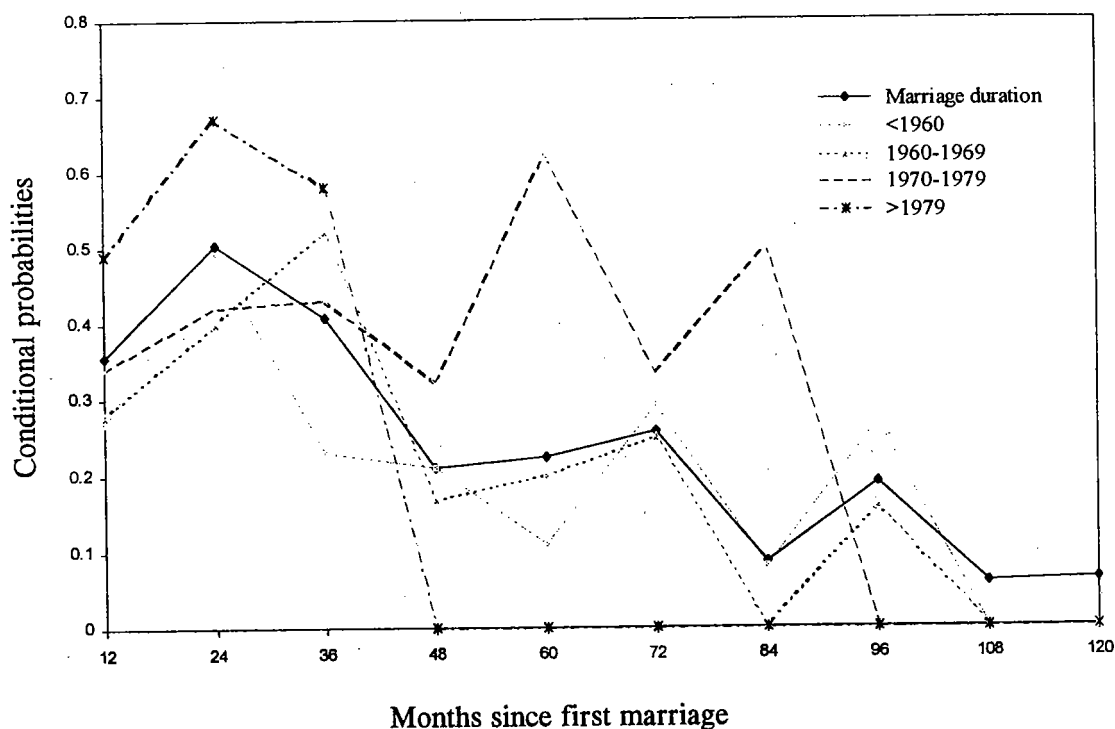
Months Since First Marriage	Total		<1960		1960-69		1970-79		>1979	
	qx	N	Qx	N	Qx	N	qx	N	qx	N
12	.35	301	.27	83	.28	58	.34	61	.49	99
24	.50	191	.49	61	.40	42	.42	40	.67	48
36	.41	91	.23	31	.52	25	.43	23	.58	12
48	.21	52	.21	24	.17	12	.32	13		
60	.22	40	.11	19	.20	10				
72	.26	31								
84	.09	23								
96	.19	21								
108	.06	17								
120	.06	16								

qx = Conditional probability of having first birth after marriage. N = Numbers exposed to risk. Note: Blank cell indicates not applicable.

reveal, conditional probabilities increase during the first year of marriage and tend to peak at 24 months since marriage. The likelihood that a first birth would be highest before the end of the second year of marriage is due to the nine month gestation period. By the second year of marriage, 50 percent of women have given birth; after the third year of marriage the likelihood of a first birth declines steadily.

The patterns of the first two marriage cohorts (<1960 and 1960-1969) are similar with a relatively lower probability of having a first birth in the first 12 months of marriage: a probability of about .27 as compared to a probability of .49 for the most recent marriage cohort. Figure 1 also shows that women who have married recently are more likely to experience the first birth sooner after marriage than women who were married some years ago.

Figure 1 Conditional probability of having a birth among ever married women by marriage duration and marriage cohort, Kirtipur



Multivariate Analysis

Table 3 describes variables used in the multivariate analyses of the timing of first birth. Background variables considered in these analyses are: marriage cohort, father's work experience, respondent's outside exposure before marriage and respondent's literacy. Age at

marriage, choice of spouse and customary gift exchange are the marriage characteristics. Additionally, time, time squared and an interaction term of time x gift exchange are included in the regression analyses.

The division of marriage cohorts into four categories enables me to explain the temporal variation, if any, in the timing of the first birth. The posited direction of and reasons for the effects of father's work experience and respondent's outside exposure before marriage have been previously discussed. As far as education is concerned, women were categorized into those who can read and write and those who cannot at the time of the survey. Nevertheless, a comparison of ever-attended school and literacy variables confirms that, for girls/women, education is acquired prior to marriage.

Table 3 Variables and their distribution used in the analytical models, Kirtipur, 1993

Variable/Definition	Proportion	N
Marriage cohort		
Omitted category <1970	.47	141
Dummy variable 1970-79	.20	61
Dummy variable >1979	.33	9
Father's work experience before respondent's marriage		
0 = No wage labor	.21	63
1 = Wage labor	.79	238
Respondent's outside exposure before marriage		
0 = Never lived outside village	.83	251
1 = Lived outside	.17	50
Respondent's literacy		
0 = Cannot read and write	.76	229
1 = Can read and write	.24	72
Age at marriage		
0 = <19	.54	164
1 = >18	.46	137
Choice of spouse		
0 = Parents/seniors chose	.71	215
1 = Respondent chose	.29	86
Exchange of gifts in marriage process		
0 = No gifts exchanged	.52	158
1 = Gifts exchanged	.48	143

Age of marriage is dichotomized into those married below 19 years of age and those married at age 19 and above. This variable captures the changing fecundity of women with age. Furthermore, this variable measures the effective date of cohabitation; among Kirtipur Newars, unlike some other segments of the population, there is virtually no difference between age of marriage and age of cohabitation. As previously stated, choice of spouse is an indicator of women's autonomy. Finally, if gifts are exchanged in the marriage process, couples tend to become intimate more quickly, thereby having a shorter first birth interval.

Since the paper focuses on the sociodemographic and cultural factors associated with the timing of the first birth, I examine covariates of the first birth interval for non-contracepting women. The dependent variable in the multivariate models is the risk (hazard rate) of having a first birth after marriage, not the risk of first conception. Discrete time event history analysis is used since this method is quite flexible and makes no assumption about the shape of the hazard function (Allison, 1984; Fricke and Teachman, 1993; Guikay and Rindfuss, 1987). The analysis is based on person-years; women who experience an event (a birth) are censored at that point in time. For the 301 ever-married women there are a total of 804 person-years. Furthermore, the dependent variable is dichotomous, coded 0 if no birth occurred and 1 if a birth occurred in a given year. Therefore, the multivariate models were estimated using logistic regression (Morgan and Teachman, 1988; Hosmer and Lemeshow, 1989).

Table 4 shows the results of the multivariate analyses. For ease of interpretation the log odds are given. These transformed coefficients can be interpreted as the amount by which the odds of experiencing an event (a first birth) are multiplied for each unit change in the explanatory variables (Morgan and Teachman, 1988). A coefficient greater than 1 means that an increase in that covariate is associated with a greater likelihood of having a first birth, i.e., a positive effect. A coefficient less than 1 indicates a decrease in the probability of having a first birth as that covariate increases, i.e., a negative effect. A coefficient of 1 implies no effect.

The relationship between one variable and the odds of a first birth controlling for time and time squared are displayed in the first column of Table 4. Model 1 contains background variables only. Model 2 shows the relationship between risk of a first birth and marriage characteristics. Model 3, the final model, controls for both background and marriage characteristics.

Table 4 Odds ratio (OR) of giving birth in years since marriage for all ever married women, Kirtipur, 1993

Variable	Zero Order*		Model 1		Model 2		Model 3	
	OR	P	OR	P	OR	p	OR	p
Marriage cohort								
1970-1979	1.36	(.123)	1.23	(.315)	1.31	(.185)	1.22	(.359)
>1979	2.16	(.000)	1.79	(.008)	1.93	(.001)	1.66	(.026)
Father's work experience before respondent's marriage	1.45	(.043)	1.33	(.128)			1.30	(.169)
Wage labor								
Respondent's outside exposure before marriage								
Lived outside	2.09	(.001)	1.73	(.023)			1.70	(.031)
Respondent's literacy								
Can read and write	1.78	(.003)	1.18	(.471)			1.15	(.558)
Respondent's first age at marriage								
>19	1.57	(.004)			1.39	(.050)	1.34	(.081)
Choice of spouse								
Respondent's chicce	1.38	(.066)			1.23	(.283)	1.14	(.505)
Exchange of gifts								
Gifts exchanged	1.26	(.213)			1.19	(.386)	1.18	(.416)
Time x gifts	1.14	(.085)			1.18	(.042)	1.19	(.035)
Time			1.10	(.365)	1.01	(.917)	1.03	(.807)
Time squared			1.03	(.011)	1.04	(.010)	1.04	(.008)
Model X ²			70.70		70.74		78.30	

*Controlling for time and time squared.

Note: Total number of cases = 804. Blank cell indicates variable not included.

The zero order correlations show significant associations with marriage cohort, father's work experience, respondent's outside exposure before marriage, respondent's literacy and respondent's age at marriage. Women who married after 1979 have a significantly higher risk of having a first birth than those who married before 1970; they are 116 percent more likely to experience a first birth in any given interval, according to the zero order effects. The cohort who married in the 1970s does not differ significantly from earlier cohorts as far as the likelihood of having a first birth is concerned, though the effects are positive. These effects of marrying in a later cohort remain significant but decrease in strength as additional variables are added to the models. This suggests these variables may exert influence on the marriage process itself, in addition to influencing the risk of having a first birth.

Daughters whose fathers worked as wage laborers are 45 percent more likely than those whose fathers performed other work to have a first birth in any given interval, according to the zero order

effects. This variable retains its positive effect but loses its significance as other variables are added to the models. Women who lived outside their natal home before marriage are 109 percent more likely than those who did not to have their first birth in any given year. This effect remains significant across models.

Respondent's literacy also exerts a strong and significant effect on the likelihood of having a first birth. Yet, this effect diminishes as other variables are added to the model, thereby suggesting that women's literacy may be related to other variables in the model. Women who marry at age 19 and above have a 57 percent higher risk of having a first birth than those marrying before the age of 19. Again, this effect weakens slightly in Models 2 and 3. The respondent's own choice of spouse—the women's autonomy variable—is positive but not significant in any of the models, suggesting that women who choose their own spouse may be more likely to experience a first birth.

Finally, whether or not gifts were exchanged during the marriage process has been added into the equation with an interaction term (gift x time) to assess the possible changing effects of this variable over time. These effects are positive meaning that women in marriages in which gifts are exchanged are more likely to experience an early first birth; this effect strengthens over time.

Conclusion

Based upon theoretical and empirical studies, I have argued that social transformation which encourages quicker intimacy between spouses is an important factor in the explanation of temporal changes in the interval between marriage and first birth. The cohort analyses of the first birth interval revealed that this interval has been declining among the Newar women of Kirtipur.

The results show significant effects of birth cohort, respondent's outside exposure before marriage and the interaction term, gift x time. Women who have married recently and who have lived outside the village before marriage are more likely than others to have a first birth in any given interval. Marriages in which gifts are exchanged also increase the probability of having a first birth quickly; these situations may provide the new bride with a sense of security which facilitates the building of intimacy.

The effects of other variables, while not significant, are in the expected directions. This suggests that women's literacy, an increased age of marriage and having one's own choice of spouse may encourage

the establishment of intimacy between a husband and wife and, therefore, lead to a shortening of the first birth interval. Women who have more autonomy have shorter first birth intervals than others. Further study is needed to determine how the timing and spacing of births impacts upon Nepal's fertility transition.

References

- Acharya, L. B. 1998. "Determinants of fertility in the 1970s and 1990s in Nepal." *Contributions to Nepalese Studies* Special Issue on Fertility Transition in Nepal, ed. S. Thapa, S. G. Neidell, and D. R. Dahal, 25(Special Issue): 95-108.
- Allison, P. D. 1984. *Event History Analysis*. Beverly Hills: Sage.
- Bennett, L. 1976. "Sex and motherhood among the Brahmins and Chhetris of East-Central Nepal." *Contributions to Nepalese Studies* 3: 1-52.
- Bongaarts, J. 1982. "The fertility inhibiting effects of the intermediate fertility variables." *Studies in Family Planning* 13: 179-89.
- Chen, R. and S. P. Morgan. 1991. "Recent trends in the timing of first birth in the United States." *Demography* 28: 513-533.
- Dahal, D. R. 1993. "Rethinking fertility transition: Some observations from Nepal." In *Population Dynamics in Nepal and Related Issues of Sustainable Development*. Ed. Bal Kumar K. C. Kirtipur: Central Department of Population Studies, Tribhuvan University. Pp. 49-58.
- Dyson, T. and M. Moore. 1983. "On kinship structure, female autonomy, and demographic behavior in India." *Population and Development Review* 9: 35-60.
- Fricke, T. and J. D. Teachman. 1993. "Writing the names: Marriage style, living arrangements, and first birth interval in a Nepali society." *Demography* 30: 175-188.
- Guilkey, D. and R. R. Rindfuss. 1987. "Logistic multivariate analysis: A communicable approach." *Sociological Methods and Research* 6: 276-300.
- Hirschman, C. 1985. "Premarital socioeconomic roles and the timing of family formation: A comparative study of five Asian societies." *Demography* 22: 35-60.
- Hosmer, D. W. and S. Lemeshow. 1989. *Applied Logistic Regression*. New York: John Wiley.
- Kallan, J. and J. R. Udry. 1986. "The determinants of effective fecundability based on the first birth interval." *Demography* 23: 53-66.

- Kasarda, J. D., J. O. G. Billy, and K. West. 1986. *Status Enhancement and Fertility*. Orlando: Academic Press.
- Kravdal, O. 1994. "The importance of economic activity, economic potential and economic resources for the timing of first birth in Norway." *Population Studies* 48: 249-268
- Morgan, S. P. and J. D. Teachman. 1988. "Logistic regression: Description, examples, comparisons." *Journal of Marriage and Family* 50: 925-936.
- Niraula, B. B. and S. P. Morgan. 1996. "Preference for sons and daughters in Benighat, Nepal: Implications for fertility transition." *Social Biology* 42: 256-274.
- Rindfuss, R. R. and S. P. Morgan. 1983. "Marriage, sex, and first birth interval: The quiet revolution in Asia." *Population and Development Review* 9: 259-278.
- Rindfuss, R. R., A. Parnell, and C. Hirschman. 1983. "The timing of entry into motherhood in Asia: A comparative perspective." *Population Studies* 37: 253-272.
- Rindfuss, R. R., L. L. Bumpass, and C. St. John. 1980. "Education and fertility: Implications for the roles women can occupy." *American Sociological Review* 45: 431-447.
- Rindfuss, R. R., J. A. Palmore, and L. L. Bumpass. 1989. "Analyzing birth intervals: Implications for demographic theory and data Collection." In *Demography as an Interdiscipline*. Ed. J. Mayone Stycos. New Brunswick: Transaction. Pp. 193-210.
- Ryder, N. 1965. "The cohort as a concept in the study of social change." *American Sociological Review* 30: 843-861
- Thapa, S. 1997. "Timing of family formation in ethnic mosaic Nepal: A district-level analysis." *Asia-Pacific Population Journal* 12: 75-87.
- Thapa, S. 1989. "The ethnic factor in the timing of family formation in Nepal." *Asia-Pacific Population Journal* 4: 3-34.
- Thorton, A. and T. Fricke. 1989. "Social change and the family: Comparative perspectives from the West, China, and South Asia." In *Demography as an Interdiscipline*. Ed. J. Mayone Stycos. New Brunswick: Transaction.
- Trussell, J. et al. 1985. "Determinants of birth-interval length in the Philippines, Malaysia, and Indonesia: A hazard model analysis." *Demography* 22: 145-168.
- Tsuya, N. and M. K. Choe. 1994. "Nuptiality change in Asia: Patterns, causes and prospects." Paper presented at the Michigan Family Studies Seminar, Institute for Social Research, University of Michigan, Ann Arbor, Michigan.

- Tuladhar, J. M. 1989. *The Persistence of High Fertility in Nepal*. New Delhi: Inter-India Publications.
- Yang, Q. and F. Wang. 1994. "Marriage, sex, and first birth interval: The not-so-quiet revolution in China." Paper presented at the 1994 Annual Meeting of American Sociological Association, Los Angeles.

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Regional Patterns of Fertility in Nepal

Bhim P. Subedi

Nepal is characterized by distinct physiographic and ethnic diversities which present challenges and opportunities for its development. In this vein, regional level perspectives are important to understand existing disparities. This paper focuses on regional patterns of fertility and its implications. The objective is to examine *where* significant change in fertility has taken place and to examine its association with selected socioeconomic factors. The emphasis on space (i.e., region) as the unit of analysis is guided by the conviction that "geography matters." This approach is similar to other areal-level analyses in which countries, districts or communities are used as the unit of analysis as distinct from those analyses that use individual persons or households as the unit of analysis. Areal-level analysis complements individual-level analysis.

Data and Methodology

Using data from two population censuses taken 20 years apart, 1971 and 1991, I examine two related measures of fertility: the child-woman ratio (CWR) and the change in the proportion of children and women in the population between the two census periods. Both are period measures of fertility. The CWR is simply a ratio of the number of children, 0 to 4 years of age, to the number of women in the reproductive age group, 15-49, at a fixed point in time. This ratio is

based on age-sex structure of the census population and is, therefore, a crude measure. However, the measure is especially useful in planning for social provisions (i.e., schooling and child health interventions). The ratio may also be thought of as a measure of "effective" of fertility because children who die early in life are excluded (Misra, 1995).

I have chosen the CWR as a measure of fertility for three main reasons. First, in a situation in which the vital registration system is nonfunctional and comparable estimates from sample surveys are unavailable, the census based CWR is a convenient fertility measure for cross-sectional analysis at the sub-regional or district levels (see also, Jones 1990). Second, data reporting in the census is along geopolitical administrative boundaries. Given this, comparisons at the regional or district level for different points in time are possible. Third, the CWR is a simple measure with minimal data requirements.

The other fertility measure used in this analysis is the proportion of children (0-4 years) and of women (15-49) in the total population. I use this to assess the direction of change in the fertility level by considering changes in mortality and the age structure as well as improvements in age reporting.

I have also used cluster analysis to discern regional patterns and changes. Background factors included in the cluster analysis are: overall percentage literate (for ages 6 and over), percentage of women literate among women of reproductive age (15-49), infant mortality rate (per 1,000 births), and percentage of women of reproductive age currently using contraception. Literacy data are taken from the 1991 census (CBS, 1993); infant mortality data are based on the 10 percent sample of 1991 census data as reported by Thapa (1996); and contraceptive prevalence data are based on the 1991 national survey (MOH, 1993). The selection of these factors is somewhat arbitrary. The cluster analysis uses the 75 districts (as of 1991) as the unit of analysis.

The quality of census data is an important issue. Some amount of undercounting has been found in both censuses. Indirect estimates have placed the undercounting at four percent in the 1991 census (CBS, 1994b). Similar independent estimates of under or overcounting are not available for the 1971 census, although some reports speculate that undercounting of children 0-4 years of age is higher than four percent (CBS, 1987). In the 1991 census, quality in the content and coverage has improved (Karki, 1995). The population enumerator ratio is roughly comparable in both censuses i.e., 963:1 in 1991 and 925:1 in 1971. Likewise, the sex ratio is normal and both censuses follow the usual

pattern of decrease with an increase in age. The United Nations age-sex accuracy index value is also roughly comparable in both censuses, although the 1991 census is on the border line between "inaccurate" and "highly inaccurate" (Karki, 1995).

The two prevalent regionalization schemes in Nepal are *ecological* which divides the country into Mountain, Hill and Terai and *developmental* which divides the country into Eastern, Central, Western, Mid-western and Far-western regions. While the first scheme overlooks east-west variation, the latter overlooks north-south variation. I take intraregional differences and data availability into consideration and use 15 regions in the analysis of regional fertility patterns; I refer to these as ecodevelopment regions. These cross-classifications strategies have been adapted for national surveys also (e.g., MOH, 1997).

Results

Child-Woman Ratio

The 1971 census (CBS, 1975) recorded a total of 1,634,110 children from 0 to 4 years of age and 2,784,761 women of reproductive age (15-49). The CWR was 0.587 or 587 children per 1,000 women. According to the 1991 census (CBS, 1994a), there were 2,707,352 children and 4,403,624 women of respective ages. Thus, the child-woman ratio was 0.615 or 615 children per 1,000 women. The 1991 ratio is almost five percent higher than the 1971 ratio.

Between 1971 and 1991, all five ecodevelopment regions in the Mountain ecological region showed an increase in the child-woman ratio (Table 1). The Mid-west, Far-west and Central regions showed greater percentage increases than the Eastern and Western subregions. Part of these increases may have been due to improvements in the quality of the data, primarily in the coverage of children, as well as in improvements in child mortality. The entry of large numbers of women into childbearing ages may also have increased these ratios. However, determining the amount of change in the ratio due to this transition is beyond the scope of this paper. Nevertheless, the fact that the amount of change in four out of five subregions ranges from 13 to 21 percent may be an indication of an increase in fertility in the Mountain ecological region.

Table 1 Child-woman ratio, 1971 and 1991

Ecodevelopment Regions	Child-woman Ratio		Change (1971-1991)	
	1971	1991	Absolute	Percent
Eastern Mountain (EM)	0.551	0.620	0.069	12.5
Central Mountain (CM)	0.543	0.626	0.082	15.1
Western Mountain (WM)	0.442	0.476	0.034	7.6
Mid-western Mountain (MWM)	0.553	0.655	0.102	18.5
Far-western Mountain (FWM)	0.530	0.642	0.113	21.2
Mountain (all)	0.541	0.632	0.091	16.7
Eastern Hill (EH)	0.584	0.627	0.043	7.4
Central Hill (CH)	0.590	0.551	- 0.039	-6.6
Western Hill (WH)	0.557	0.610	0.053	9.5
Mid-western Hill (MWH)	0.606	0.699	0.092	15.2
Far-western Hill (FWH)	0.522	0.656	0.134	25.6
Hill (all)	0.575	0.610	0.035	6.1
Eastern Terai (ET)	0.645	0.558	- 0.086	-13.4
Central Terai (CT)	0.594	0.621	0.027	4.6
Western Terai (WT)	0.553	0.628	0.075	13.5
Mid-western Terai (MWT)	0.680	0.681	0.000	0
Far-western Terai (FWT)	0.702	0.731	0.030	4.2
Terai (all)	0.616	0.617	0.001	0
Nepal	0.587	0.615	0.028	4.8

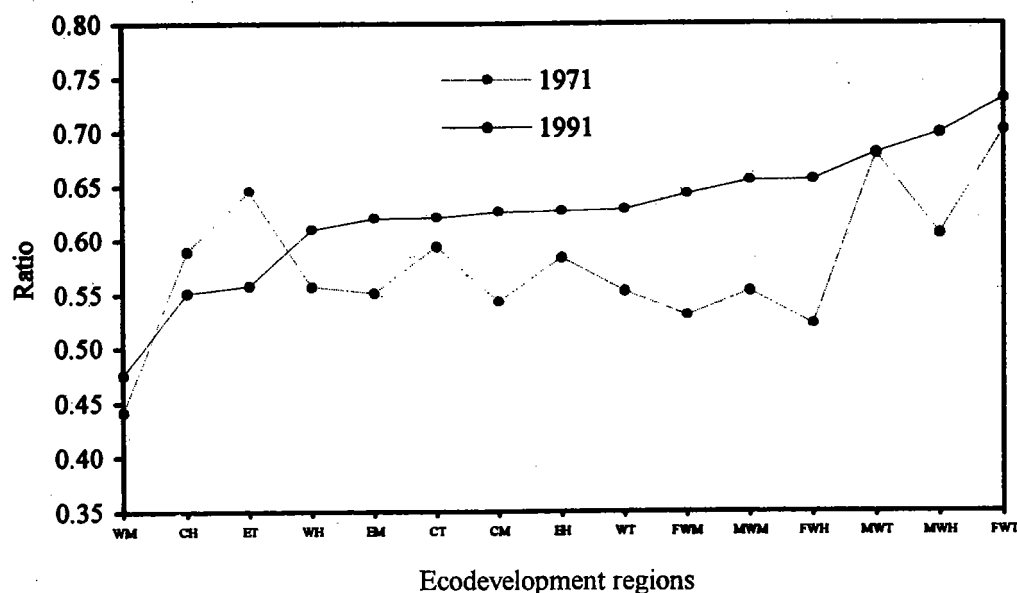
The subregions in the Hill ecological region present a somewhat mixed scenario. The Central Hill revealed a clear decline with the CWR, decreasing from 0.590 in 1971 to 0.551 in 1991. On the other hand, the Far-western Hill showed a clear increase in the CWR from 0.522 to 0.656, approximately 26 percent. The Mid-western Hill showed an increase of 15 percent.

Within the Terai ecological region, the Eastern Terai showed a decline of 13 percent. On the other hand, the Western Terai region showed a 14 percent increase in the ratio. The changes in the remaining areas (i.e., Central Terai, Mid-western Terai and Far-western Terai) were not large.

Figure 1 provides a summary of the CWR in 1971 and in 1991. (I have plotted the regions ranging from low to high ratios based on the 1991 data.) Of particular interest is the case of the Central Hill and the Eastern Terai where the CWR is considerably lower in 1991 than in 1971. The implication I draw is a clear decline in overall fertility.

Similarly, the case of the Mid-western Terai, in which no change is observed, is also interesting. The subregions with wider gaps include the Central Mountain, the Far-western Mountain, the Mid-western Mountain, the Far-western Hill, and the Mid-western Hill. Among these, the Far-western Mountain, the Far-western Hill and the Mid-western Hill ecodevelopment regions stand out as regions with a possible rise in fertility.

Figure 1 Child-woman ratio (CWR) by ecodevelopment regions, 1971 and 1991



WM = Western Mountain, CH = Central Hill, ET = Eastern Terai, WH = Western Hill, EM = Eastern Mountain, CT = Central Terai, CM = Central Mountain, EH = Eastern Hill, WT = Western Terai, FWM = Far-western Mountain, MWM = Mid-western Mountain, FWH = Far-western Hill, MWT = Mid-western Terai, MWH = Mid-western Hill, FWT = Far-western Terai.

Note: The regions are listed according to the values (low to high) based on the 1991 data.

The change in the age structure, especially the number and proportion of women entering childbearing years, affects the CWR. It is, therefore, important to analyze changes in the proportion of children and women in the total population between the two census periods.

Changes in the Proportion of Children (0-4 years of age) and Women of Childbearing Age

In 1971, the proportion of children (0-4) in the total population was 0.141 ranging from 0.111 to 0.161 in the different ecodevelopment regions (Table 2). The highest proportion was recorded in the Far-western Terai and the lowest in the Western Mountain. In 1991 the proportion of children in the total population was 0.146, ranging from 0.111 to 0.166. The Western Mountain recorded the lowest proportion. Several subregions recorded an increase in the proportion of the children; specifically the Far-western Hill, the Far-western Mountain and the Mid-western Mountain showed larger proportional increases than other ecodevelopment regions.

Table 2 Changes in the proportion of children (0-4) and of women (15-49), 1971 and 1991

Ecodevelopment Regions	Proportion of Children in the Total Population			Proportion of Women in the Total Population		
	1971	1991	Change	1971	1991	Change
EM	0.131	0.145	0.015	0.237	0.235	-0.002
CM	0.132	0.144	0.012	0.243	0.231	-0.013
WM	0.111	0.111	-0.001	0.252	0.233	-0.019
MWM	0.139	0.160	0.021	0.251	0.245	-0.007
FWM	0.133	0.157	0.025	0.251	0.245	-0.006
Mountain	0.132	0.150	0.018	0.245	0.238	-0.007
EH	0.138	0.148	0.010	0.236	0.235	-0.001
CH	0.140	0.133	-0.007	0.238	0.242	0.004
WH	0.137	0.150	0.013	0.247	0.246	-0.001
MWH	0.149	0.166	0.017	0.246	0.238	-0.009
FWH	0.134	0.160	0.026	0.257	0.245	-0.012
Hill	0.140	0.147	0.008	0.243	0.242	-0.001
ET	0.148	0.135	-0.013	0.230	0.242	0.012
CT	0.144	0.145	0.001	0.243	0.234	-0.009
WT	0.134	0.145	0.012	0.242	0.231	-0.010
MWT	0.159	0.157	-0.002	0.233	0.230	-0.003
FWT	0.161	0.166	0.005	0.230	0.227	-0.003
Terai	0.146	0.145	-0.001	0.237	0.235	-0.002
Nepal	0.141	0.146	0.005	0.241	0.238	-0.003

EM = Eastern Mountain, CM = Central Mountain, WM = Western Mountain, MWM = Mid-western Mountain, FWM = Far-western Mountain, EH = Eastern Hill, CH = Central Hill, WH = Western Hill, MWH = Mid-western Hill, FWH = Far-western Hill, ET = Eastern Terai, CT = Central Terai, WT = Western Terai, MWT = Mid-western Terai, FWT = Far-western Terai.

Between 1971 and 1991 the proportion of children increased in four of the five ecodevelopment regions in the Mountain ecological region; only in the Western Mountain did the proportion remain about the same. In the Hill ecological region, almost all the ecodevelopment regions (the exception being the Central Hill) recorded an increase in the proportion of children. In the Terai ecological region, the Eastern Terai showed a large decline in the proportion of children. On the other hand, the Western Terai recorded an increase by about the same proportion. The changes in the remaining three regions were minimal.

Based on the direction of change in the proportions of children and of women between 1971 and 1991, three distinct groups of ecodevelopment regions may be classified. The Eastern Terai and the Central Hill are characterized by a decrease in the proportion of children and an increase in the proportion of women; the implication of this being a clear decline in fertility. The Mid-western Terai and the Western Mountain are characterized by a decrease in the proportions of both children and women. This may be indicative of a trend toward a decline in fertility. Finally, the remainder (11 of the 15) regions show an increase in the proportion of children and a decrease in the proportion of women. In seven of 11 of these regions, the increase in the proportion of children is greater than the decrease in the proportion of women.

An increase in the proportion of children ages 0-4 and a decrease in the proportion of women of childbearing age suggest the possibility of several underlying phenomena. First, the actual number of children born to women of childbearing age may have increased at the regional level despite the fact that various national surveys conducted over the past two decades have reported an overall decline in fertility (Retherford and Thapa, 1998). Second, the decrease in the proportion of women may be a reflection of a relative increase in the proportion of children. Third, the actual improvement in mortality, which disproportionately improves child survival rates, may have resulted in an increase in the proportion of children in the total population. These ratios may also reflect the decrease in infant mortality rates between 1971 and 1991. The Central Bureau of Statistics estimated that the infant mortality rate (per 1,000 live births) declined from 172 in 1971 to 97 in 1991 (CBS, 1987; Shrestha, 1995). Fourth, the improvement in data quality may have decreased the underreporting of children thereby increasing the proportion of children in the total population. There is, however, still the possibility of underreporting of children aged four

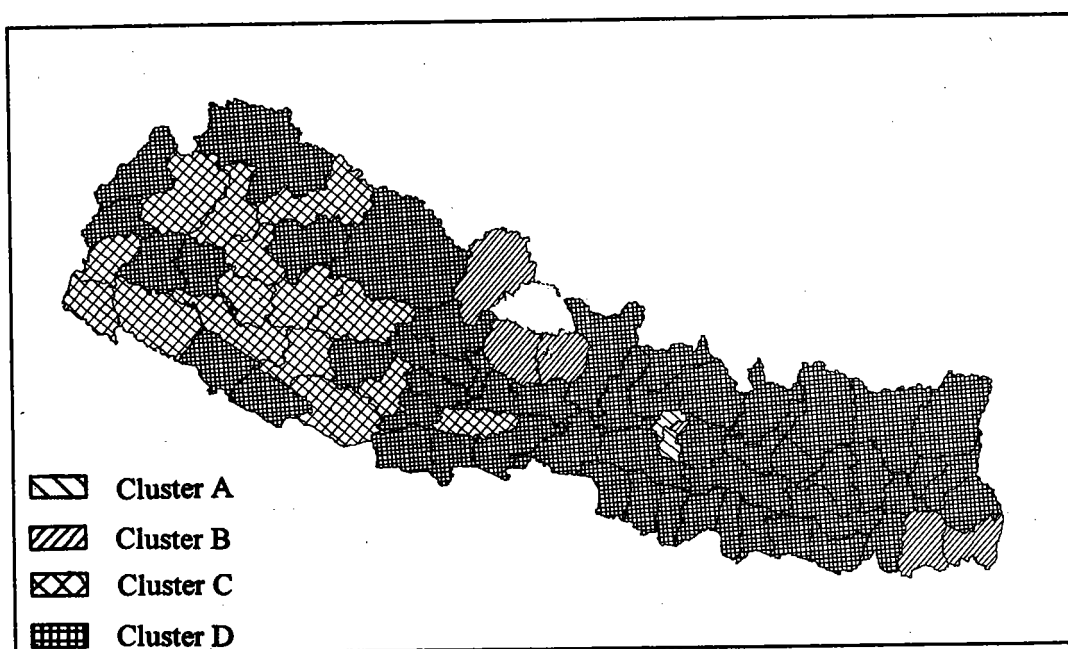
due to the widespread practice of digit preference in age reporting; many children aged four might have been recorded as being five years old.

Fertility Regimes Based on Cluster Analysis

Unlike the preceding analyses, I have used the district as the unit of analysis for the cluster analysis. By using the centroid method for hierarchical cluster (Aldenderfer and Blashfield, 1984), I classify districts with similar fertility (as measured by the proportion of children and of women) by their socioeconomic characteristics of the 75 districts. As mentioned earlier, the socioeconomic indicators used include overall literacy, infant mortality, literacy among women of childbearing age and contraceptive prevalence rates. Comparable data on infant mortality, contraceptive prevalence and literacy at the district level for both 1971 and 1991 were unavailable. Thus, the cluster analysis is limited to 1991 data.

The cluster analysis was performed using SPSS/PC software (Norusis, 1992). Four clusters (I excluded Manang since it was an outlier) were identified; they are labeled as A, B, C and D. The clusters with their respective districts are shown in Map 1.

Map 1 Fertility Regimes Based on Cluster Analysis, 1991



Cluster A includes only two districts—Kathmandu and Lalitpur. The CWR in these two districts is the lowest and the values of the socioeconomic indicators are the highest. A large proportion of the population in these districts consists of migrants (although the exact percentage is difficult to ascertain). These two districts also rank first and second in terms of the human development index (for details, see Thapa, 1995). As shown in the analysis by Thapa (1995), the human development index (HDI) is itself strongly correlated with several other developmental variables in the 75 districts of the country. Clearly, a decline in fertility is closely associated with favorable socioeconomic conditions.

Cluster B includes six districts across four ecodevelopment regions. The districts include, Mustang (Western Mountain), Bhaktapur (Central Hill), Lamjung and Kaski (Western Hill) and Jhapa and Morang (Eastern Terai). Although they cover various ecodevelopment regions, their socioeconomic characteristics are only slightly lower than those of Cluster A. In none of these districts does the CWR exceed 540 per 1,000 women. In particular, the CWR has declined by more than 20 percent in Jhapa, Morang and Bhaktapur between 1971 and 1991. Overall, a relatively better socioeconomic condition is associated with a measurable decline in fertility in these areas.

Cluster C includes fifteen districts. This cluster can be considered a plateau of relatively high fertility. Districts in this cluster, which covers all three ecological regions but only the Mid and Far-west regions (with the exception of Palpa), consistently demonstrate very high CWRs and high infant mortality rates. Female literacy is very low and there is wide variation in contraceptive prevalence rates. Five of the 15 districts namely Mugu, Kalikot, Jajarkot, Bajura and Bajhang are among the districts with the lowest human development index. The HDI values in the remaining districts vary widely.

Cluster D includes the largest number of districts. Fifty-one of the 75 districts belong to this cluster; the districts represent all ecodevelopment regions. In most of these districts, the proportion of children has gone up and the proportion of women gone down. Summarizing their level of socioeconomic development is difficult; the HDI values vary considerably in the districts. It is this cluster where a clear sign of fertility decline is difficult to ascertain and the situation may be considered inconclusive.

Discussion and Conclusion

Assuming that there are no serious selectivity biases in the census data, the results presented here suggest a mixed pattern of fertility changes in the 15 ecodevelopment regions during the 20-year period, 1971-1991. Fertility has clearly declined in only two of the 15 regions—the Eastern Terai and the Central Hill. These regions are characterized by high levels of the human development index and other socioeconomic factors. These results are consistent with cross-national as well as country-specific studies which show that favorable socioeconomic conditions and family planning programs are strongly associated with reductions in fertility (e.g., Bulatao and Lee, 1983; Cutright, 1983; Mauldin, 1985; Rodrigues and Aravena, 1991; Singh and Casterline, 1985).

In fifteen districts—almost all of them in the Far and Mid-west regions—there is a plateau in the level of fertility. In this cluster the proportions of children and women are high but over the years the proportion of children has been increasing and the proportion of women has been decreasing. The influence of socioeconomic factors is minimal and these districts are characterized by relatively low human development indices. This suggests that there may not be a threshold level of socioeconomic conditions in these districts. Cross-national studies (e.g., Cutright, 1983; Mauldin, 1985) have found that a threshold level of socioeconomic conditions is a necessary precondition for fertility decline.

Increases in the child-woman ratio in certain areas may not be ruled out. Studies elsewhere have found that fertility increases may occur particularly if there is a lag in the increased use of contraception during the process of modernization (Dyson and Murphy, 1985 and 1986; Nag, 1980; Jones, 1990). Significant increases in the fertility levels with early modernization were reported in South America in the late 1940s and 1950s (Collver, 1965 cited in Jones, 1990) and in parts of Sub-Saharan Africa in the 1970s (Valentine and Revson, 1979; Romaniuk, 1980).

Some of the apparent differences and changes in the 15 ecodevelopment regions may be related to the quality of the data as well as to changes in mortality. No attempt has been made in this paper to analyze the relative role of each of these and other related factors. Nonetheless, the analysis presented here provides some insights for further research toward understanding fertility differentials at the regional level in Nepal.

References

- Aldenderfer, M. S. and R. K. Blashfield. 1984. *Cluster Analysis*. Thousand Oaks, CA: Sage Publications.
- Bulatao, R. A. and R. D. Lee. 1983. "An overview of fertility determinants in developing countries." In *Determinants of Fertility in Developing Countries*. Eds. R. A. Bulatao and R. D. Lee. New York: Academic Press. Vol. 2, pp. 757-787.
- Central Bureau of Statistics (CBS). 1994a. *Population Census 1991*. Vol. I. Part I. Kathmandu: CBS.
- Central Bureau of Statistics (CBS). 1994b. *Population Projection for Nepal, 1991-2011*. Kathmandu: CBS.
- Central Bureau of Statistics (CBS). 1993. *Population Census 1991*. Vol. I, Part X. Kathmandu: CBS.
- Central Bureau of Statistics (CBS). 1987. *Population Monograph of Nepal*. Kathmandu: CBS.
- Central Bureau of Statistics (CBS). 1975. *Population Census 1971*. Vol. I. Part I. Kathmandu: CBS.
- Cutright, P. 1983. "The ingredients of recent fertility decline in developing countries." *International Family Planning Perspectives* 9: 101-109.
- Dyson, T. and M. Murphy. 1986. "Rising fertility in developing countries." In *Population Structures and Models*. Eds. R. Woods and P. Rees. London: Allen and Unwin. Pp. 68-94.
- Dyson, T. and M. Murphy. 1985. "The onset of fertility transition." *Population and Development Review* 11: 399-440.
- Jones, H. 1990. *Population Geography*. London: Paul Chapman Publishing.
- Karki, Y. B. 1995. "Organization, design and quality aspects of the 1991 population census of Nepal." In *Population Monograph of Nepal*. Kathmandu: Central Bureau of Statistics. Vol. 2, pp. 503-534.
- Mauldin, W. P. 1985. "Conditions of fertility decline in LDCs, 1965-80." Background paper. Washington, DC: The World Bank.
- Ministry of Health (MOH). 1997. *Nepal Family Health Survey 1996*. Kathmandu: Ministry of Health, New ERA, and Macro International.
- Ministry of Health (MOH). 1993. *Nepal Fertility, Family Planning and Health Survey 1991*. Main Report. Kathmandu: Ministry of Health.
- Ministry of Health (MOH). 1987. *Nepal Fertility and Family Planning Survey Report 1986*. Kathmandu: Ministry of Health.
- Misra, B.D. 1995. *An Introduction to the Study of Population*. New Delhi: South Asian Publishers.

- Nag, M. 1980. "How modernization can also increase fertility." *Current Anthropology* 21: 571-587.
- Norusis, M. J. 1992. *SPSS/PC+*. Chicago: SPSS Inc.
- Retherford, R. D. and S. Thapa. 1998. "Fertility trends in Nepal, 1977-1995." *Contributions to Nepalese Studies* Special Issue on Fertility Transition in Nepal, ed. S. Thapa, S. G. Neidell, and D. R. Dahal, 9-58.
- Rodrigues, G. and R. Aravena. 1991. "Socio-economic factors and the transition to low fertility in less developed countries: A comparative analysis." In *Demographic and Health Surveys World Conference*. Columbia, MD: IRD/Macro International. Vol. I, pp. 39-72.
- Romaniuk, A. 1980. "Increase in natural fertility during the early stages of modernization: Evidence from an African case study, Zaire." *Population Studies* 34: 293-310.
- Shrestha, K. P. 1995. Mortality Levels, Trends and Differentials. In *Population Monograph of Nepal*. Kathmandu: Central Bureau of Statistics. Pp. 85-130.
- Singh, S. and J. Casterline. 1985. "The socio-economic determinants of fertility." In *Reproductive Change in Developing Countries*. Eds. J. Cleland and J. Hobcraft. London: Oxford University Press. Pp. 199-222.
- Thapa, S. 1996. "Infant mortality and its correlates and determinants in Nepal: A district-level analysis." *Journal of the Nepal Medical Association* 34: 94-109.
- Thapa, S. 1995. "The human development index: A portrait of the 75 districts in Nepal." *Asia-Pacific Population Journal* 10: 3-14.
- Valentine, C. and J. Revson. 1979. "Cultural traditions, social change, and fertility in Sub-Saharan Africa." *Journal of Modern African Studies* 17: 453-472.

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Women's Autonomy and Reproductive Behavior in Two Urban Areas of Nepal

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Introduction

In recent years, increasing attention has been given to improving women's status and enhancing their roles in the process of socioeconomic development. Various dimensions related to these issues are being explored. One prominent school of thought has investigated the linkage between women's status and their reproductive behavior and holds that as inequalities between the sexes diminish, the emerging processes set off behavioral changes that culminate in a decline in fertility (Mason, 1986; Jejeebhoy, 1988 and 1995). The present study builds upon this assumption and further explores the mechanisms of autonomy that result in fertility differentials between subgroups of women.

Following Dyson and Moore (1983), we use the term 'autonomy' rather than 'status' to avoid confusion between 'status' and 'esteem' which may or may not be related to women's autonomy. In this regard, the referent is women's autonomy in relation to other women and to men. Dyson and Moore (1983: 45) define autonomy as "the capacity to manipulate one's personal environment" and "the ability—technical, social, and psychological—to obtain information and to use it as the basis for making decisions about one's private concerns and those of one's intimates."

Several socioeconomic factors may affect women's autonomy. Jejeebhoy (1988) reviewing Indian literature on women's position and interrelations with fertility and mortality, identified three critical components of women's autonomy: (1) control over material and social resources; (2) knowledge, opportunities and alternatives available to women; and (3) women's position within the home. In other words, women's position can be understood in terms of decision-making, freedom of movement and domestic autonomy.

Nepal is known as a land of diversity (Bista, 1972). Its population is comprised of different castes, ethnic and tribal groups and has been affected by a series of historical migratory processes from both sides of its border. From the southern Indian plains, it inherited Hindu and Muslim groups while from the north (Tibet/China) it inherited Buddhists. These groups often lived in harmony with the indigenous tribal populations and a process of assimilation and acculturation developed; this is the foundation of Nepali society and culture.

Because of its varied heritage, there are wide variations in women's status across the caste and ethnic groups in Nepal. The landmark study in the regard is *The Status of Women in Nepal* (Acharya and Bennett, 1981). This report documented that women's status varies across caste-ethnic lines—in some groups women have relatively higher positions in society. In general, this research found higher women's autonomy among the hill tribal populations and lower autonomy among the Hindu caste groups.

A study by Morgan and Niraula (1995) found that the hill and the Terai (lowland plains in the South) villages in rural Nepal vary dramatically in the degree of women's autonomy. Freedom of movement and wives' household decision-making power are markedly higher in the hill than in the Terai setting. Some of the implications of the lower autonomy of Terai women were higher demand for children, and a lower level of contraceptive use. Further, Niraula and Morgan (1994) found that village differences in household structure, wives' education and wives' work status in different settings did not account for the differences in women's autonomy. Subsequent research revealed that sharp differences in autonomy in the different settings exist in community institutional structures (Morgan and Niraula, 1995; Niraula and Morgan, 1996). The researchers (Morgan and Niraula, 1995; Niraula and Morgan,

1996) concluded that women in the hills were more autonomous than their counterparts in the Terai because the "cultural context" provided flexibility and options that the Terai women did not have. Cultural constructs as revealed in the nature of patriarchy and the caste-system were found to be very rigid in the rural Terai; this contributed to women's lower status and autonomy. Little is known about women's autonomy and gender roles in urban Nepal.

In this paper, we focus on urban Nepal. The main research question we pursue is whether the differences in women's autonomy between the rural hill and Terai settings prevail in urban Nepal, independent of the potential effects of caste-ethnicity. We also examine the interrelationship between autonomy and reproductive behavior.

Methodology and the Settings

We purposively selected two urban settings—one each in the hill and Terai regions. We selected areas that were as alike as possible, differing only with respect to a single 'test' variable (Smith, 1989). This strategy follows from our strategy to maximize variability on women's status in order to provide a strong test of the effect of women's status on fertility (Morgan and Niraula, 1995; Niraula and Morgan, 1994 and 1996). We selected Brahmins, Chhetris and Newars (for a description of these ethnic groups, see Bista, 1972), the three dominant caste groups from both urban areas. According to the 1991 census, these three caste groups account for more than one-third of Nepal's population.

We used a modified version of the survey tools previously used by Niraula and Morgan (1994). These included three sets of structured survey questionnaires: household, eligible woman, and husband questionnaires. The individual level data collection was supplemented by a community questionnaire. Finally, some case studies were documented.

The survey was conducted from February to April 1997. Prior to the fieldwork, field staff, both male and female interviewers, underwent training. Male interviewers were responsible for the household and husband questionnaires; female interviewers were responsible for the woman (eligible respondent) questionnaires. Most of the interviewers were graduates with previous experience in conducting surveys.

The voters' lists from the respective municipalities were used for drawing samples. Households belonging to the three caste groups were marked and listed. Based on the number of households in each category of caste and the required number of households, a random number was selected for the starting point and an equal number of households from each caste group was selected. This yielded 304 and 280 ever-married women aged 15-49 in Biratnagar (Terai) and Ilam (hill), respectively. The survey was conducted in the two sites simultaneously. The study populations and their major characteristics are shown in Table 1.

Ilam and Biratnagar represent the hills and the Terai, respectively. Both are the headquarters of the respective districts and both the urban settings have special significance for Nepal's administrative and industrial development. Ilam is famous for its beautiful landscape that includes Nepal's premier tea industry. Ilam borders with the Indian district of Darjeeling, a hill resort area which is famous for tea plantations, tourism and high quality boarding schools. Ilam municipality is an area of historical importance in modern Nepal's struggle for democratic freedom. Because of its close proximity to the schools in the east (India) and access to both the hill and Terai districts, Ilam has become the hub of many economic, social and cultural activities.

Biratnagar is Nepal's second largest city and its pioneer industrial district. It has Nepal's earliest industrial establishments and is home to many of the politicians who led the 1951 revolution and were in the limelight thereafter. As is the case with most of the Terai settlements, Biratnagar's population is dominated by migrants from both directions—the hill people from the North and the people of Indian origin from the South.

Both Ilam and Biratnagar became part of the Nepal kingdom after the conquest of the petty states by the Gorkhali army. Until then, both the areas are believed to have been ruled by a *Kirati*, representing an Eastern hill ethnic/tribal group. Until the 1950s, Biratnagar, was surrounded by dense forest and infected by malaria. Because of this, it was considered a place to send criminals. The importance of the forest as a source of timber and revenue increased in the national economy, and immigrants from the north and south were encouraged to come and resettle by clearing the forests. Over time, because of its location and easy access to India, Biratnagar witnessed the establishment of many pioneer industries, such as jute,

Table 1 Selected socioeconomic characteristics and populations of the study areas, Morang and Ilam, 1997

Characteristics	Morang (Terai)	Ilam (Hill)
Major occupation		
Service	20.6	12.3
Business/trade	6.3	9.7
Agriculture	2.2	6.6
Average household annual income (Rs.)	69,299	65,752
Development infrastructure		
Access to all weather road	Yes	Yes
Existence of a large number of govt. and non-government agencies/offices, school, college, hospitals	Yes	Yes
Percent of households with radio	93.0	84.6
Percent of households with TV	89.3	44.9
Percent of households with telephone	37.3	19.9
Percent of households with modern toilet facility	93.1	62.1
Percent of households using gas, electricity or kerosene as cooking fuel	77.6	51.1
Schooling of children		
Percent of school-going population to the total (5-19)	91.9	83.1
Percent of girls (5-19) not in school	4.3	9.2
Percent of boys (5-19) not in school	3.8	7.7
Study population		
Total population	1517	1531
Percent male	49.4	51.0
Percent female	50.6	49.0
Percent of population (0-14 yrs)	30.7	38.6
Percent of population (6 years and above) illiterate	8.7	12.5
Female	13.8	19.7
Male	3.8	5.0
Mean years of schooling of women respondents (among those who have attended school)	8.9	9.3
Number of households	304	280
Ethnicity		
Brahmin	100	87
Chhetri	105	97
Newar	99	104
Average size of household	5.0	5.7
Number of women (15-49) interviewed	304	288
Number of husbands interviewed	179	181

sugarcane, match and textiles. Furthermore, the labor movement in these industries is believed to have contributed significantly to the ousting of the Rana regime in 1951.

Ilam and Biratnagar are thus Nepal's foremost urban centers and have been the hub of many socioeconomic and political changes. Nevertheless, the areas do differ. While Ilam has been rejuvenated by commercialization of tea, dairy products and crop diversification, Biratnagar is attempting to overcome years of stagnation and recession and to regain its importance in the country's economy.

Results

Since the central issue examined in this paper is whether significant differences exist between women's autonomy and fertility behavior in the study populations, we begin the analysis by examining gender roles in the settings. Variability in gender experience is fundamentally different from that based on caste, class and ethnicity. Because of their family and kin relationships with men, women are generally distributed across these other social hierarchies (Niraula and Morgan, 1994).

Table 2 shows women's responses to questions regarding who does various household activities/tasks. The responses have been ordered from tasks most often done by women to those most often done

Table 2 Gender roles in various activities (percent saying 'yes' to the question who does the specified work most), Morang and Ilam, 1997

Activities	Morang (Terai)		Ilam (Hill)		Odds Ratio (Terai/Hill)
	Odds F/M	Rank	Odds F/M	Rank	
Washing clothes	52.2	1	54.4	2	0.96
Washing dishes	45.6	2	48.8	3	0.93
Food preparation	40.9	3	70.5	1	0.58
Child care	24.1	4	37.5	4	0.64
Cleaning the house	21.2	5	33.1	5	0.64
Fetching water	9.2	6	18.7	6	0.49
Foodgrain purchase	2.9	7	0.3	9	2.78***
Keeping of money	2.8	8	0.1	13	4.06***
Buying clothes	2.4	9	0.3	10	2.45***
Processing food	2.1	10	1.5	8	1.44
Animal care	1.2	11	1.6	7	0.73
Fetching fuel-wood	0.6	12	0.2	12	3.40**
Supervise agricultural work	0.2	13	0.3	11	0.72
Earnings	0.2	14	0.1	14	1.74*

Significant at * $p < 0.05$; ** $p < 0.005$, *** $p < 0.001$. F/M = Female/Male.

by men. The data clearly show that most of the tasks are gender-specific in both settings. The odds ratio in column 3 measures the difference between settings in the extent to which tasks are feminine (or masculine). The gender stereotypes hold for most of the tasks performed at the household level. The dichotomy of 'inside' tasks for women and 'outside' tasks for men is clearly evident. The first seven tasks are overwhelmingly performed by women in both settings. For these tasks, the odds in column 3 are less than 1.0, indicating the tasks are less feminine in the hills than in the plains. However, none of these differences are statistically significant. The traditional roles assigned to women are still practiced in both settings. Women bear primary responsibilities for washing clothes, washing dishes, preparing food, child care, cleaning the house and fetching water.

Some of the tasks that have important implications for women's autonomy are, however, significantly different across the settings. For example, purchase of foodgrains and clothes and keeping of money differ; these differences are statistically significant. Since both the settings are urban, fuel-wood is not gathered or collected from the forest; it is available in the local market and thus, men are involved in the purchase of the fuel. This activity is more masculine in the Terai setting than in the hill setting.

Table 3 shows how gender roles in performing various activities are translated into household decision-making roles. As in the previous table, decisions are ranked from those mostly made by women to those mostly made by men. Columns 3 and 6 show the relative rank of the decisions in the two settings. The first five categories of decisions are mostly made by women and score almost the same in both settings; there are no significant setting differences. However, from decision categories six and beyond, most of the decisions are made by men; and significant setting differences appear.

The Terai urban setting seems to have a relatively better gender balance with regard to household decisions on children's treatment and their schooling, and the purchase of major goods such as jewelry and television than the hill urban setting.

The data presented in Tables 2 and 3 are consistent with two main findings previously reported by Niraula and Morgan (1994). First, almost all tasks and decisions are gender-based—performed disproportionately by either men or women. Second, rank ordering of tasks from feminine to masculine is similar across settings. Contrary to the findings from the two rural settings analyzed by Niraula and

Table 3 Wives' responses to questions on who makes most decisions, Morang and Ilam, 1997

Who Decides	Morang (Terai)		Ilam (Hill)		Odds Ratio (Morang/Ilam)
	F/M	Rank	F/M	Rank	
What food to cook	9.17	1	8.57	1	1.07
Son's misbehavior	1.31	2	1.21	3	1.08
Daughter's misbehavior	1.24	3	1.30	2	0.95
Whether to have next child	1.10	4	1.00	4	1.10
How many children to have	1.03	5	0.82	5	1.21
Medical treatment for daughters	0.84	6	0.28	8	2.98***
Medical treatment for sons	0.73	7	0.30	6	2.45***
Daughter's education	0.58	8	0.14	12	4.11***
Son's education	0.50	9	0.17	11	2.86***
Purchase of jewelry	0.46	10	0.28	9	1.63***
You working outside	0.38	11	0.18	10	2.15***
Type of schooling	0.27	12	0.10	13	1.94**
Purchase of tv etc.	0.21	13	0.08	15	2.59***
Children's marriage	0.18	14	0.29	7	0.61*
Institutional loan	0.14	15	0.10	14	1.36
Non-institutional loan	0.13	16	0.08	16	1.73
Land transactions	0.12	17	0.08	17	1.46

Significant at * $p < 0.05$; ** $p < 0.005$; *** $p > 0.001$.
F = Female; M = Male.

Morgan (1994), however, the hill urban setting in this study shows a sharper gender division of labor than the Terai setting.

Gender differentials in tasks performed and decisions made lead to differential power. These power differentials are, in turn, reflected in the relative freedom of mobility. In both settings, men were seen everywhere—in markets, offices, and traveling—whereas women's presence was negligible. Yet given the greater differentiation of tasks and decisions in the hill settings, we expect that women's freedom of movement would be lower in the hills than in the Terai. Table 4 presents data relating to these aspects.

Two types of data were collected regarding women's freedom of movement. The first type reflects societal values and norms, and was worded—"is it acceptable for you to go to certain places alone." The second type of information relates to whether the woman goes to these places alone. The questions yielded similar responses. We have used the latter type of information in generating Table 4, i.e., whether the women go certain places alone. In both settings, women's freedom of movement is high. Women tend to go alone to the local market, the

Table 4 Women's response to questions on whether they go alone to specific places (percent saying 'yes'), Morang and Ilam, 1997

Places	Morang (Terai)	Ilam (Hill)	Odds Ratio (Morang/Ilam)
1. Local market	98.4	95.5	3.26*
2. Health post	98.7	94.8	4.76**
3. Field/outside	90.5	77.4	2.99***
4. Public places	95.1	81.0	6.12***
5. Friends/relatives	96.2	93.8	2.9*
6. Temples/fair	96.1	88.9	2.74**
7. Other village	82.2	37.8	7.45***
8. Cinema	75.0	17.4	17.04***
9. Local bank	91.4	62.8	4.36***
10. Local clubs	58.6	22.9	6.41***

Significant at * $p < .05$; ** $p < .005$; *** $p < 0.001$.

health post/hospital, and to visit friends and relatives. Going to the cinema hall, the bank and the local clubs is more restricted. These restrictions are greater in the hills than in the Terai and the differences are statistically significant. Differences in topography of the settings may partially explain observed differences in freedom of movement indicators.

Women's access to and control over resources are important for their autonomy. In Nepal, men are projected as the sole 'bread-earner' of the household. Given this, the extent to which women have access to and control over important resources, the extent to which they depend on men for support for themselves and their children/dependents and the degree to which women attest to these attitudes can be considered measures of women's economic autonomy. We present women's response to these questions in Table 5.

The data show that women contribute to important household decisions (i.e., how the household income is spent) in both urban settings. Women in the hills reported having a greater say in this decision than women in the Terai, but the difference is not statistically significant. In both settings, almost one-third of women have ownership of landed property, a major source of income, wealth and socioeconomic status. However, ownership of personal property and valuables are much higher for women in the Terai. Having personal property enables women to exercise and manipulate situations to their advantage. More women in the Terai said they would be able to support themselves and their dependents without their husbands, and the difference between the settings is statistically

Table 5 Women's responses to household income, ownership of resources and attitude towards self-support (percent saying 'yes'), Morang and Ilam, 1997

Items	Morang (Terai)	Ilam (Hill)	Odds Ratio (Morang/Ilam)
1. Have a say in how household income is spent	78.9	80.6	0.89
2. Ownership of landed property	32.9	28.5	1.23
3. Ownership of other personal valuable property	57.0	26.0	5.5***
4. Able to support self and dependents without husband	44.7	36.1	1.43*
5. Free to buy a sari worth Rs. 300	68.8	70.5	0.92
6. Free to buy jewelry worth Rs. 1000	53.9	30.2	3.58***

Significant at * $p < 0.05$; *** $p < 0.001$.

significant. In both settings, almost 70 percent of the women can autonomously buy a sari worth Rs. 300. However, as one moves to a more valued item such as jewelry worth Rs. 1000, women in the Terai are much more likely to autonomously buy jewelry of their choice.

For further analysis we have developed autonomy scales from these measures—one which measures women's economic autonomy and the other their freedom of movement. For the economic indicator, we selected items 1, 4, 5 and 6 from Table 5; and for the freedom of movement indicator, we selected items 1, 3, 7 and 9 from Table 4. These scales range from 0-4 in which the lower value represents lower autonomy and the higher value indicates higher autonomy. A score of 0 indicates that women have no autonomy whereas a score of 4 indicates that women enjoy autonomy in all four indicators included in the scale. The results are presented in Table 6.

Table 6 shows that more than three-fourths of women have a freedom to movement score of 3 or more indicating that women enjoy relative freedom of mobility in both settings. However, in the case of economic autonomy, three-fifths of women are in the 0-2 range indicating that women have relatively less economic autonomy as compared to their freedom of movement.

The significant setting differences seen in Tables 4 and 5 are transferred to these scales. More than 70 percent of women in the Terai setting have a freedom of movement score of 4; the corresponding figure for the hill setting is less than half this number. There are also significant setting differences in economic autonomy

Table 6 Freedom of movement and economic autonomy scales, Morang and Ilam, 1997

Autonomy Scales	Morang (Terai)		Ilam (Hill)		Total	
	N	%	N	%	N	%
Freedom of movement						
0 (low autonomy)	5	1.6	4	1.4	9	1.5
1	15	4.9	20	6.9	35	5.9
2	34	11.2	62	21.5	96	16.2
3	24	7.9	12	38.9	136	23.0
4 (high autonomy)	226	74.3	90	31.5	316	53.4
X ² (DF)	124.1*** (4)					
Economic autonomy						
0 (low autonomy)	6	2.0	18	6.3	24	4.1
1	49	16.1	42	14.6	91	15.4
2	103	33.9	136	47.2	239	40.4
3	90	29.6	72	25.0	162	27.4
4 (high autonomy)	56	18.4	20	6.9	76	12.8
X ² (DF)	29.7*** (4)					

Significant at ***p<0.0001.

between the two settings. Terai women have more economic autonomy than hill women.

As stated earlier, one of the objectives of this paper is to examine how the autonomy factor influences reproductive behavior. Because the number of cases is too small to calculate age-specific or total fertility rates across settings, current use of contraception among women who want no more children is used as an indicator for reproductive intentions. Bivariate analysis of autonomy and unmet need (not shown here) revealed that the hill setting has lower unmet need than the Terai setting. This was unexpected given the fact that women in the hills ranked lower on the autonomy scales than their counterparts in the Terai. To disentangle the effects of various socioeconomic variables on the dependent variable, i.e., unmet need among women, we use logistic regression. Means and standard deviations of the dependent and independent variables included in the multiple regression analysis are shown in Table 7.

Table 8 shows that the effect of the independent variables on unmet need does not vary substantially between the partial and full models; i.e., the direction of all effects is constant. Therefore, we will concentrate on interpreting the full model effects.

Table 7 Mean and standard deviation (S.D.) of socioeconomic variables, Morang and Ilam, 1997

Variables	Mean	S.D.
Age (age minus median age)	0.89	7.25
Education	7.05	4.28
Proportion of respondents as wife of household head	0.86	0.35
Number of living sons	1.12	1.85
Number of living daughters	1.16	1.06
At least two living sons	0.31	0.46
At least one living daughter	0.70	0.46
Possession of high valued goods (radio, tv, viewing, telephone)	2.84	1.42
Proportion of Chhetri	0.34	0.48
Proportion of Newar	0.34	0.48
Freedom of movement	3.20	1.01
Proportion of hill respondents	0.49	0.50
Proportion with low income	0.34	0.47
Economic autonomy	2.30	1.00
Proportion with unmet need for contraception	0.31	0.46
Proportion of love marriages	0.267	0.44

Women living in the hill setting are less likely to have an unmet need for contraception. Living in the hills decreases the likelihood of having unmet need by 55 percent. We suggest one reason for this effect of living in the hills (which would be unexpected given the similarity of the two settings) is its close proximity to Darjeeling, a district in India which has a long history of family planning programs and innovative programs for social reforms.

As far as autonomy variables are concerned, economic autonomy stands out in its effect on unmet need. Specifically, for each point increase in economic autonomy women are less likely to have an unmet need by a factor of 62 percent. Each increase in freedom of movement reduces unmet need by a factor of 49 percent; this effect is significant at the 10 percent level. However, given the small sample size and the strength of the effect, we consider this to be significant.

Finally, only two background variables exert a significant effect on unmet need. Having additional daughters increases the odds of having unmet need. This variable, however, must be interpreted cautiously. This may be reflecting ideal family composition preference—that of two sons and one daughter (Niraula and Morgan, 1996a). Being a wife of the household head increases the likelihood of having an unmet need.

Table 8 Logistic regression coefficients of the effects of socioeconomic and demographic characteristics on unmet need for contraception, Morang and Ilam, 1997

Variables	Model I		Model II	
	B	S.E	B	S.E
Demographic				
Age minus median age (31)	-0.022	0.024	-0.014	0.025
Age squared	-0.002	0.003	-0.003	0.003
Age at marriage	0.041	0.051	0.05	0.053
Number of living sons	0.304	0.215	0.279	0.220
Number of living daughters	-0.453+	0.142	0.338*	0.146
Social				
Respondent's education	-0.031	0.044	-0.003	0.045
Husband's education	-0.169	0.425	-0.906	0.934
Relation to household head	0.673	0.478	0.803+	0.487
Chhetri	-0.278	0.401	-0.214	0.424
Newar	-0.044	0.401	-0.025	0.424
Love marriage	0.127	0.344	0.295	0.360
Economic				
Possession of household valuables	0.014	0.138	0.063	0.141
Income	0.182	0.214	0.212	0.222
Hill district	-0.453	0.318	-0.798*	0.351
Autonomy				
Freedom of movement			-0.672+	0.383
Economic autonomy			-0.962**	0.388
-2 Log likelihood	259.01		245.77	

Significant at + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Discussion and Conclusion

We included several socioeconomic variables that are thought to be important indicators of female autonomy and are likely to influence women's reproductive intentions in this analysis. Empirical results have suggested that age is an important indicator of women's autonomy (Basu, 1996). Other literature has established the negative effects of education, beyond the primary level, on fertility. Results do not support these relationships. In both urban areas we studied, educational levels are high among the general population. This has reduced the relative importance of female education and is supportive of the view that mass education is an important contributor to the onset of fertility decline and changes in reproductive behavior (Caldwell, 1980; Caldwell, B., 1996). Given the patriarchal structure we also considered family composition. As previously stated having a

daughter in the family increases the odds of having an unmet need. The results did not show any significant differences in fertility intentions among castes.

There may be several pathways through which autonomy can impact fertility behavior. General expectations are that higher levels of autonomy reduce fertility, with intermediate variables operating at several levels. In rural Nepal, Niraula and Morgan (1994 and 1996) found that exposure to the outside world through education had a significant impact on autonomy and fertility. But, in this analysis of two urban settings many variables that are likely to affect fertility behavior have been held constant. In both settings, more than 40 percent of women have schooling beyond the high school level. The average household income does not vary much between settings. Age at marriage is slightly higher in the hill setting. Both areas have access to modern facilities and infrastructures: schools, colleges, hospitals, electricity, televisions and telephones. The number of children ever born and number surviving are almost identical in both settings. And although there are some significant differences in gender performed tasks between the settings, scores for women's autonomy are relatively high for both settings.

Our analysis found that women's economic autonomy influences use of contraception; women with greater economic autonomy are less likely to have an unmet need for contraception. Freedom of movement is another autonomy measure that influences fertility behavior but its effect is considerably less than that of economic autonomy. However, neither background nor women's autonomy variables mediate the effect of residing in a hill district. That is, the effect of place of residence (hill or Terai) remains strong and independent of all other factors. These results are consistent with previous studies which showed that those living in the hills are less likely to have an unmet need for contraception than those in the Terai.

Both study communities—Biratnagar and Ilam—are “modern” settings, each having access to roads, family planning services, industries and other services. We surmise that there may be some threshold level of “modernization” above which further improvements in women's autonomy may not lead to a decrease in unmet need, given the existence of certain cultural constraints and preferences. The apparent lack of the effect of women's autonomy on increased use of contraception should not, however, undermine the overall efforts aimed at improving women's autonomy that could ultimately lead to a just, equitable and gender-balanced society.

References

- Acharya, Meena and Lynn Bennett. 1981. *The Status of Women in Nepal*. The Rural Women of Nepal: An Aggregate Analysis and Summary of Eight Villages Studies. Vol. 2, Part 9. Kathmandu: Center for Economic Development and Administration, Tribhuvan University.
- Basu, Alaka M. 1996. "Girls' schooling, autonomy and fertility change: What do these words mean in South Asia?" In *Girls' Schooling, Women's Autonomy and Fertility Change in South Asia*. Eds. Roger Jeffery and Alaka M. Basu. New Delhi: Sage Publications. Pp. 48-71.
- Bista, Dor B. 1972. *People of Nepal*. Kathmandu: Ratna Pustak Bhandar.
- Caldwell, Bruce. 1996. "Female education, autonomy and fertility in Sri Lanka." In *Girls' Schooling, Women's Autonomy and Fertility Change in South Asia*. New Delhi: Sage Publications. Pp. 288-321.
- Caldwell, John C. 1980. "Mass education as a determinant of the timing of fertility decline." *Population and Development Review* 6(2): 225-255.
- Dyson, Tim and Mick Moore. 1983. "On kinship structure, female autonomy, and demographic behavior in India." *Population and Development Review* 9(1): 35-60.
- Jejeebhoy, Shireen J. 1988. *Women's Position in India and Its Interrelations with Fertility and Mortality: A Review*. Ahmedabad: The Gujarat Institute of Area Planning.
- Jejeebhoy, Shireen J. 1995. *Women's Education, Autonomy and Reproductive Behaviour: Experience from Developing Countries*. London: Oxford University Press.
- Mason, Karen Oppenheim. 1986. "The status of women: Conceptual and methodological issues in demographic studies." *Sociological Forum* 1(2): 284-300.
- Morgan, S. Phillip and Bhanu B. Niraula. 1995. "Gender inequality and fertility in two Nepali villages." *Population and Development Review* 21(3): 541-561.
- Niraula, Bhanu B. and S. Philip Morgan. 1994. "Gender inequality in two Nepali settings." Paper presented at the International Union for the Scientific Study of Population (IUSSP) seminar on Women, Poverty and Demographic Change, Oaxaca, Mexico, 25-28 October.
- Niraula, Bhanu B. and S. Philip Morgan. 1996. "Marriage formation, post-marital contact with natal kin and the autonomy of women: Evidence from two Nepali Settings." *Population Studies* 50(1): 35-50.
- Niraula, Bhanu B. and S. Philip Morgan. 1996a. "Preference for sons and daughters in Benighat, Nepal: Implications for fertility transition." *Social Biology* 42(3 and 4): 256-274.

- Smith, Herbert L. 1989. "Integrating theory and research on the institutional determinants of fertility." *Demography* 26(1): 171-184.
- Vlassoff, Carol. 1996. "Against the odds: The changing impact of schooling on female autonomy and fertility in an Indian village." In *Girls' Schooling, Women's Autonomy and Fertility Change in South Asia*. Eds. Roger Jeffery and Alaka M. Basu. New Delhi: Sage Publications. Pp. 218-234.

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The Contextual Web of Fertility Control: A Case Study of Chisang Village

Debendra Karki

Fertility decline occurs in various sociocultural, and economic contexts, mediated by the "proximate" factors (Davis and Blake, 1956; Bongaarts and Potter, 1983). Generally context is more complex to understand and its role more difficult to identify than the influence of proximate factors. In order to understand context, McNicoll (1975, 1980, 1994) underscores the need to examine institutions that encourage or discourage high levels of fertility in a society. Such institutions are multifaceted and form an integral part of the ideational, political and economic systems. McNicoll draws upon institutional theory from multidisciplinary fields and argues that the pattern of reproductive change is shaped by the combination of "institutional endowments" each society has inherited from the past. The institutional endowments include but are not limited to family systems, gender roles and community structures. He argues that reproductive behavior is the outcome of a decision-making process that involves both institutions and individuals.

This paper examines how various village and family/individual level factors have triggered measurable changes in reproductive attitudes and behavior in Chisang, a village in the Eastern Terai of Nepal. Furthermore, the research shows how the onset of changes is influenced by outside forces. The paper employs multiple research

methodologies and underscores the importance of looking at fertility change in the larger perspective.

Chisang Village

Chisang is a Terai village, located about 400 kilometers southeast of Kathmandu and 45 kilometers northeast of Biratnagar, Nepal's second largest municipality. The study village lies in the district of Morang which ranks fifth among the 75 districts in terms of the "human development index" (Thapa, 1995). For over three decades, Chisang has been linked by the East-West Highway. The village is known to have a relatively well developed educational infrastructure and school enrolment is high. Many people in the village believe that they are living longer and healthier lives than 25-30 years ago. Thus, Chisang can be considered relatively more developed compared to other villages in Morang.

Chisang's population includes a number of *jat* (castes), each of which is associated with one of three main, ranked ritual categories (Caplan, 1972). The village has a total of 638 inhabitants. Of them, 451 and 35 are "high" and "low" caste Hindus, mostly migrants from the hills. Another 89 are from the middle caste Tibeto-Burman groups. The caste Hindus and middle caste Tibeto-Burman (ethnic) groups are broadly referred to as *pahadi* (hill people). There are only 63 *adhivasis* (indigenous people of the Terai). Because of the overwhelming majority of the *pahadi* people, Chisang may be referred to as a migrants' village.

Agriculture is the primary source of employment and income for the majority of the families in Chisang. The average landholding owned by high caste households is 2.5 hectares, more than five times larger than that owned by the *adhivasi* and the low caste groups. The Tibeto-Burman households, on average, own a little over one hectare of land. There is thus a great deal of inequality in land ownership in the village. Furthermore, the land owned by the high castes is most valuable and productive.

Until about 30 years ago, much of Chisang's land was forest. Following the control of malaria in the early 1960s, the forests were cleared for cultivation by the migrants. During the same period, the East-West Highway, the principal road link in Nepal was constructed. In the 1970s, feeder roads linking the East-West Highway, Chisang and other destinations further south were constructed. Sand, stone and gravel from the Chisang *khola* (river) began to be extracted for commercial purposes. Electricity was brought into the area about five

years ago; but Chisang itself does not have electricity. The village received its first public telephone line during the time of this study.

In 1994, a sub-health post was opened in a bazaar, about a 45-minute walk from Chisang. That same year, a permanent family planning and maternal/child health clinic was opened in an adjoining village. Another non-governmental organization (NGO) based in Biratnagar began operating a mobile clinic providing antenatal and postnatal services at two locations within the area every month. The village has two medical shops.

Overall, Chisang is undergoing significant social and economic changes. Most of the villagers do not feel isolated from changes occurring in the region outside the village. The village is characterized by an increasing flow of people and ideas. Changes in reproductive attitudes and behavior need to be examined in this larger perspective.

Data and Methods

The data used in this paper were collected as part of a larger study that sought to investigate changes in the fertility behavior of the people in Chisang (Karki, 1997). The research design employed a combination of survey questionnaires and unstructured interviews, complemented by participant observation. The methodology employed and the nature of research involved is what Caldwell and his colleagues have referred to as "micro-demography" (Caldwell and Hull, 1988; Caldwell, Reddy, and Caldwell, 1988). Micro-demographic research combines components of survey research with anthropological methods. The value of the micro-demographic approach to studying fertility and mortality trends in South Asia has been demonstrated (Caldwell, Reddy, and Caldwell, 1982 and 1983).

The survey was conducted over a period of six months from July 1995 through January 1996. The nature of data collection for this study can be classified into two broad types. The first component consisted of a census and a set of structured surveys. The census questionnaire was administered to every household. A marriage and fertility history questionnaire was administered to all ever-married village women between the ages of 15 and 49 (at the time of the study). A household formation survey was also administered to all ever-married couples and a few unmarried couples living in consensual agreement. This survey was conducted almost two-thirds of the way into the fieldwork. The household formation survey collected information on the timing of events for individuals, families and entire households. The second component included unstructured, in-depth interviews with

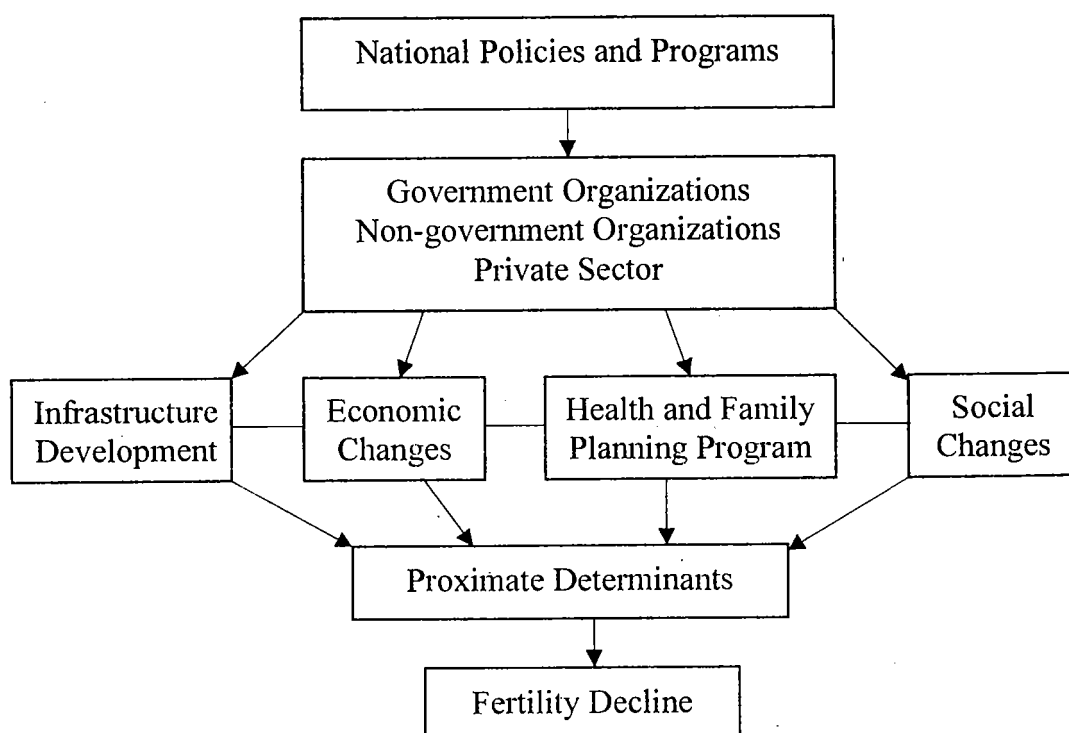
primary informants, complemented by participant observation. These unstructured interviews with primary informants and participant observation were useful in understanding perceived as well as actual changes in reproductive behavior.

The census was administered to all 111 households in the village, recording a total of 102 ever-married women aged 15-49; ninety-nine were successfully interviewed. The unstructured interviews were conducted with several individuals representing different strata of villagers, including male and female research assistants, shop owners, local leaders, high and low caste Hindus, other hill ethnic groups and *adhivasis*.

Conceptual Framework and Measures

The basic conceptual framework and the measures used in this study are shown in Diagram 1. The framework is adapted from Hull's Indonesian study (1987). The national goals and priorities are implemented through public and private organizations (including NGOs). Such policies and programs are aimed to affect various development dimensions: economy, infrastructure, health and family planning programs, social systems. Changes in these sectors are

Diagram 1 A Conceptual Framework for Understanding Causes of Fertility Decline in Chisang Village



expected to affect the proximate determinants of reproductive behavior, which eventually influence fertility. As Hull (1987: 90) has noted, "Any conceptual framework must still preserve as a basis the proximate determinants theory of fertility, which defines the interaction of social behavior with the biological processes of conception, pregnancy and birth."

The specific measures (discussed later) representing each of the dimensions were derived from in-depth interviews. Only two proximate determinants are included. The other factors, induced abortion and breastfeeding, are not included. Breastfeeding is universally practiced in the community and as such I thought that to find out reasons for breastfeeding was not central to the study. Because induced abortion is a highly sensitive topic, questions were not included in the survey component. Limited information regarding the nature and context of induced abortion was collected through in-depth interviews.

At the time of the study, a national survey—the Nepal Family Health Survey 1996—was conducted (MOH, 1997). Data from this national survey have been found to be one of the best ever collected in Nepal (Retherford and Thapa, 1998). I have used data from this survey to compare national levels and patterns of fertility, marriage and contraception with that of Chisang.

Results

Fertility Patterns

Table 1 presents age-specific and total fertility rates (per woman) for Chisang and for all rural and all urban Nepal. The total fertility rate for Chisang is slightly lower (by .22 birth per woman) than that of all rural Nepal. It is, however, considerably higher (by 1.76 births per woman) than that of all urban Nepal. This suggests that Chisang's reproductive behavior represents the more advanced spectrum of all-rural Nepal fertility. In Chisang the fertility of women aged 20-49 is consistently lower than that of the fertility of the all-rural population.

Figure 1 shows the age pattern of fertility for the three groups based on marital age-specific fertility rates for women age 20-49. (Marital fertility for women age 15-19 is not shown because teenage subfecundity generally has a "large and irregular impact" on teenage marital fertility (Knodel, 1983:66)). For comparative purposes, the figure also shows the fertility pattern of standard age-specific "natural

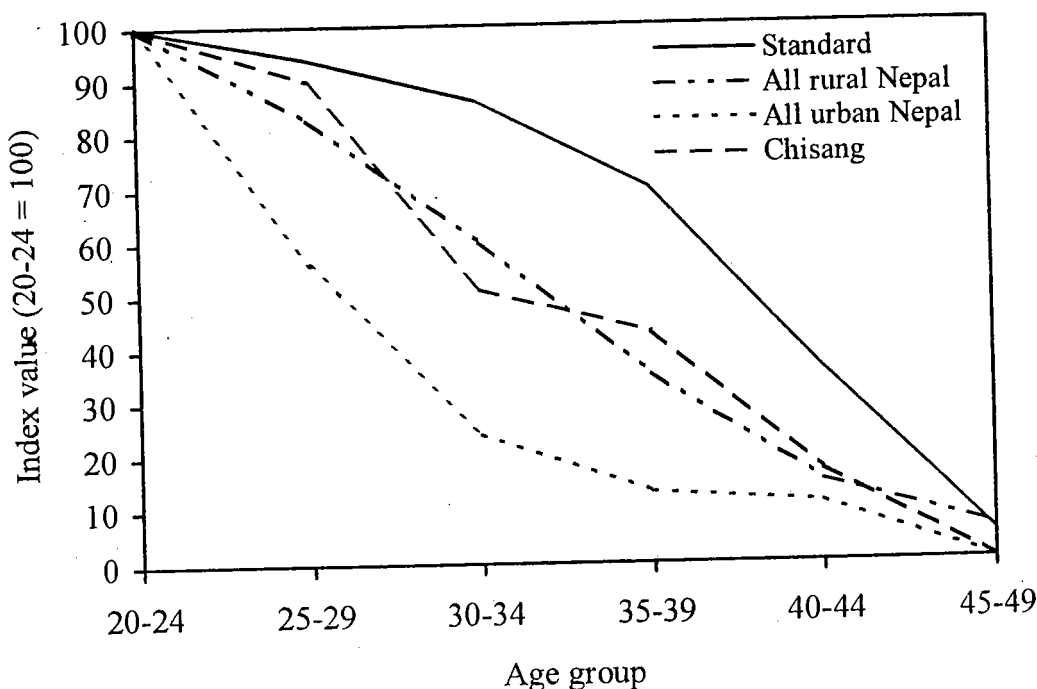
Table 1 Age-specific fertility, cumulative fertility and total fertility rates (per woman), all urban and all rural Nepal (1995) and Chisang (1995)

Age Group	All Rural	All Urban	Chisang
15-19	.129	.101	.127
20-24	.271	.211	.262
25-29	.239	.141	.225
30-34	.171	.059	.142
35-39	.100	.034	.119
40-44	.038	.025	.046
45-49	.016	.000	.000
15-49	4.83	2.85	4.61

Sources: All rural and all urban (MOH, 1997: 37); Chisang (Karki, 1997: 123).

Note: The rates for all rural and all urban are based on data for 36 months preceding the survey date (mid-January to mid-June, 1996). The estimates refer to the mid-year, 1995. Rates for the 45-49 age group may be slightly biased due to truncation. The rates for Chisang are based on data for 12 months preceding the survey.

Figure 1 Index values of age-specific marital fertility rates: Standard, all urban and all rural Nepal (1994) and Chisang (1994)



Note: All urban and all rural rates are based on averages for the period 1994 to 1996. Rates for Chisang are based on 12 months preceding the survey (1995).
Sources: Chisang (Karki, 1995); all urban and all rural Nepal (based on Nepal Family Health Survey 1996 data, made available by S. Thapa).

fertility," as developed by Coale and Trussell (1974). The age pattern of natural fertility implies parity-independent fertility determined principally by the decline of fecundity with age.

Following the methodology adopted by Knodel (1983), the age-specific marital fertility data for all rural and all urban Nepal (based on the 1996 Family Health Survey) and for Chisang are standardized by expressing the rate of each age as a percentage of the rate of the 20-24 age group. The natural-fertility curve shows the typical convex shape. In contrast, the fertility curve for all urban Nepal shows a concave shape. This confirms considerable fertility control (within marriage) among urban residents. The fertility curve for all rural Nepal is also different from that of the natural-fertility pattern, suggesting the beginning of the fertility transition in the rural population. However, the degree of control in the rural population is less than that of the urban population. The marital fertility curve for Chisang reflects some deviation from the all-rural fertility pattern. For women ages 30-34 and 45-49, the fertility curve is more concave than that of all rural; but for women ages 25-29 and 35-39 it is more convex than that of all rural Nepal women. The data indicate that the fertility transition is underway in Chasing, partly due to fertility control within marriage.

Marriage

Age-specific percentages of women who have never been married (among all women) in all rural and all urban Nepal and in Chasing village are shown in Table 2. Despite its rural characteristics, the percentage of women who have never been married in Chisang village is considerably higher than that of all rural and all urban Nepal. In the 15-19 age group, just over 70 percent of women in urban Nepal reported never being married; in Chisang, the percentage never married is almost 10 percentage points higher than in all urban Nepal. Similarly, among those 20-24 years of age, about 30 percent of women in urban Nepal reported never been married; 52 percent reported so in Chisang. The percentage not married in Chisang is higher in successive age groups also, although these percentages are based on a small number of cases. Overall, more than one-third of the women in Chisang were never married. The percentages for all urban and all rural women are 23 and 16, respectively. Clearly, lower percentage of married women and higher ages of marriage are important factors contributing to the fertility transition in Chisang.

Table 2 Percentage of women who have never been married by age group: All rural and all urban Nepal (1995) and Chisang (1995)

Age Group	All Urban	All Rural	Chisang
15-19	70.3	54.7	78.9
20-24	30.3	13.4	51.7
25-29	9.6	4.2	25.0
30-39	3.6	1.6	(11.9)
40-49	2.2	1.3	(6.3)
15-49	22.5	16.0	35.2

Sources: Estimates for all rural and all urban are based on the Nepal Health Survey 1996 (made available by S. Thapa); Chisang (Karki, 1997).

Note: Values in parentheses are based on less than 5 cases.

Fertility Regulation

In Chisang, 32.3 percent of currently married women reported using a modern method of family planning (Karki, 1997: 171). According to the 1996 Nepal Family Health Survey (MOH, 1997: 57), 24.3 percent of currently married women in rural areas and 45.1 percent of currently married women in urban areas are currently using a modern method of family planning. The percentage of women using contraception to regulate their fertility is, thus, considerably higher in Chisang than in all-rural Nepal. As in other parts of the Terai (for details on this, see Thapa and Friedman, 1998), female sterilization is the most widely used modern method among Chisang couples. This high prevalence of contraception is somewhat surprising since the sub-health post and family planning and maternal/child health clinic were established in the village only two years prior to the time the study. This suggests that those using contraception may have used services outside the village, providing further evidence of how the village is tied to the social and economic programs underway in the region.

In addition to contraceptive use, abortion is used to terminate unwanted pregnancies by some women in Chisang. In-depth interviews with the local health and social workers revealed that the workers receive Rs. 100 (approximately US \$1.60 at the time of study) and transportation expenses from health clinics in Biratnagar for referring women to obtain abortions at their clinics. Anecdotal evidence further suggests that abortion has been practiced among unmarried girls in the village. As previously stated, the prevalence of induced abortion could not be determined.

Contextual Factors Affecting Age at Marriage and Contraceptive Use

Any interpretation of Chisang's fertility decline requires an exploration of the complexity of sociocultural, economic, historical and developmental contexts. These contextual factors are not unidirectional but form a complex set of interactions, which influence the proximate factors of fertility. Policies and national planning plans promoted by various forms of governments since 1951 have also influenced these sociocultural, economic and developmental factors.

Transformation of Economic Support System

In the patron-client relationship each low-caste family performs its specialized task in return for *bali*, a fixed portion of grain at each harvest. The quantity of *bali* depends upon the size of the household or the landholding of the patron and the types of services performed by the client. In Chisang low caste families no longer perform these caste-specific occupations. Instead they are paid in cash for their work. All castes (low, middle and high) and tribes in Chisang are agriculturists; they sell their goods, services and labor for cash in the village and/or nearby towns.

After Nepal's borders were opened to the world in 1951, handmade goods had to compete with Indian and foreign mass-produced commodities. The Sarki (leather workers) and Damai (tailors) have been most affected by mass-produced imports, especially those from India, their traditional products and services were gradually replaced by mass-produced "modern" goods. This exacerbated lower demands for other low caste goods and services. In an analysis of economic and social changes in a hill village in western Nepal, Macfarlane (1976: 139) wrote: "... much of the former work of the village Blacksmith, Tailors and Cobblers is no longer necessary because of the growing market for cheap tools and clothes at Pokhara. In practice, such lower-class groups have become landless agricultural laborers working for their Gurung patrons."

Furthermore, traditional caste-based patron-client relationships were unable to compete with the emerging market driven economy. This led to a growing gap between work available for low castes and their traditional payments of *bali*. As one of the low caste Sarki from Chisang remarked:

With the decline in land productivity in the hills and the rise in grain prices, the high castes started to refuse to provide the same amount of *bali* to us as in the past. With declining *bali* payments, most of the *sano jat* (low castes) were forced to migrate to *madesh* (Terai) or India.

As a result of the failure of the economically based inter-caste patron-client relationships in the hill districts of eastern Nepal many high caste patrons and their low caste clients migrated to settings such as Chisang in the Terai. Through in-depth interviews the relationship between migration and reproductive behaviors, including later age at marriage and greater fertility control within marriage, became clear.

I migrated to Chisang because as a young and educated Brahmin I was unable to find enough *jajmans* (clients) in Pokhari (Tehrathum District). I returned to Pokhari to get married ten years later at age 33. I made sure that my wife was no more than eight years younger than I was.... At the time of my marriage I consciously decided to get married to an older (wife was 25 years old at the time of marriage) but more educated girl... After marriage I persuaded my wife to have only two children... Now that we have the desired number of children my wife takes the three-monthly injection, Depo (high caste male Brahmin).

When we left our home in Bhojpur district we first moved to Dharan and tried to find some *jajmans* (clients) only to find out that the services of the Brahmins were no longer popular in the *madesh* (Terai). We then moved to Chisang after my brother agreed to sell us some land so we could build a house. ... As a result of the demise of the *jajmani* system, we longer felt secured financially ... A few years after settling here, I had an operation in Dharan to terminate childbearing after giving birth my fourth child (wife of a Brahmin priest).

When I was growing up in Taplejung, my parents provided goods and services to most of the Brahmin families in the village in return for *bali* payments. Many of these Brahmin families were unable to make the *bali* payments on time and in sufficient quantities so my

family moved. In Chisang we provide similar goods and services for cash to people of all *jats*... I received cottage industry training from a Biratnagar based organization and I have been weaving cloth for *dhaka ko top* (traditional colored hats) for the last five years... I do not wish to get married for another five years. I think I will be around 25 years old then. If I was not attending school or was unemployed, then my parents and married brothers would have pressured me to get married. Although I am not attending school now, I am employed and pay for all my expenses. Therefore, both my parents and elder brothers no longer pressure me to get married (unmarried low caste woman).

The economic institution of *hattiya* (weekly market) in eastern Nepal has also helped to transform the economic support system. Many people in Chisang sell or exchange their surplus goods at the *hattiya*. Additionally, according to the VDC Chairman, the village pundit and the health and social worker, recently the *dhami* and *jhankri* (indigenous healers) have started to provide reproductive health care services at the *hattiya*.

During fieldwork I visited many nearby *hattiyas*, in both towns and villages. Approximately, half of those who frequented the *hattiyas* were women. Through attending these *hattiyas*, both married and unmarried women were exposed to the urban lifestyle and ideas that exist beyond Chisang. Thus, the *hattiya* serves to diffuse "modern" ideas as well as to dispense contraceptives. In the words of the VDC (Village Development Committee) Chairman with whom I visited a *hattiya* in a nearby town:

The weekly *hattiya* provides *gaonley* (rural folks) goods and services that city folks cannot live without. In a way the *hattiya* is the medium through which urban tastes and lifestyles are promoted to rural people. For example, in this *hattiya* you will notice that a doctor from Biratnagar has a clinic; a street vendor is selling *chakki* (contraceptive pills) and *dhaal* (condoms). If it was not for the *hattiya* in this part of the country many married women would face severe difficulties obtaining family planning materials... In the center of town three different cinema companies are screening Hindi movies today... What these *hattiyas* do is bring a part of the city into the rural town or village

for that day... At least for that day, the *hattiya* plays a major role in introducing rural people to a very different environment that exists in far away places, such as Kathmandu or Guhati or maybe Punjab.

In a similar vein, a 29 year old married Chettri woman underscored the importance of *hattiya*, stressing its role in ideational change to control fertility within marriage and the distribution of modern contraceptives:

I live with my in-laws and husband's brothers and their wives. As a member of a joint family it is not appropriate for me to go to the family planning office in order to be injected every three months. Instead I go with my neighbor to the *hattiya* in Belbari (nearby trading town) where a trained health worker provides the services free of cost at the weekly health clinic. Since many people come and go at the *hattiya* very few people take notice of women who make use of these services... I am also able to watch movies, purchase cosmetics and sell surplus products in exchange for cash at the *hattiya*. I use this cash income to purchase items that are normally found only in larger towns and in Biratnagar. I also save some money to pay for the school fees of my three children... If it were not for the *hattiya*, it would have been difficult for me to act against the wishes of my in-laws and travel to the family planning office every three months in order to be injected.

Changes in Land Tenure System

Prior to the unification of Nepal in the latter half of the eighteenth century many of its tribal peoples followed a land tenure system known as *kipat*. In the words of Regmi (1978: 534): "A kipat owner derives rights in kipat land by virtue of his membership in a particular area... This, nevertheless, does not mean that land under kipat tenure is necessarily cultivated on communal basis."

Some two decades before this study was conducted, the authorities in Kathmandu had been successful in bringing all tribal lands under a uniform system of land tenure, akin to freehold and known as *raikar*. Regmi (1976) has described *raikar* as 'state landlordism' whereby the rights of an individual to the use and transfer of land are

recognized by the state as long as taxes are paid. In a study of the Limbu people of Ilam district in Pallo Kirat, Caplan (1970, 1991) maintains that it was particularly the high caste Hindus who were accused of bearing the responsibility for conversion of *kipat* lands to *raikar*. Caplan (1991: 311) states: "Indeed, because of their literacy and their sharing of caste and kinship backgrounds with members of the administration, well placed Hindus were certainly able to take advantage of legislation to improve their land holdings, and reduce those of the Limbus." The increasing loss of *kipat* land meant that the Limbu people were no longer able to support themselves from their land.

Due to the loss of security provided to middle caste Limbus after the alienation of their *kipat* lands in the Hill Districts, many Limbus have been forced to migrate to the Terai, including the village of Chisang. These Limbus, along with other caste Hindu migrants, have been forced to innovate in order to adjust in this new settlement. Rise in age at marriage and fertility control within marriage are two of the innovations of this migrant community.

Our parents and grandparents were lucky as they had access to the *kipat* lands. By the time I was married, we had land enough to feed us for only about six months of the year. Being unable to feed my family I left behind (in the hills) my wife and two children and moved to Chisang almost 12 years back. My wife and two children joined me in Chisang after a gap of four years. Due to separation we did not have any children during that time. Even then we did not have a lot of money and had to struggle to feed ourselves and our two children... By this time a few women from the village were traveling to Biratnagar and Dharan to be injected every few months. My wife also joined these women and has been receiving the injections every few months for the last seven years. Now our two children are in high school and we do not see any reason why we should have more children (Limbu farmer late 30s).

My parents tell me that they lost their lands to the clever Bahuns in our village in the hills and were forced to migrate to this village. Our family also lived in West Bengal (India) for about seven years where I completed high school. When we returned to Chisang I was hired as a teacher in the local primary school...

My parents want me to get married but there are very few unmarried men of my *jat* in this area who have completed high school and are employed in the government office. Marrying a man from my *jat* in a far away place means that I will have to stop teaching. That is something I do not wish to do. That means that I may have to remain unmarried for a few more years (unmarried Limbu woman early 20s).

Expansion of the Transportation Network

The construction work on the East-West Highway, the main transportation link in Nepal, began in the northern part of the eastern Terai in the early 1960s, with the clearing of thick tropical forests. This construction, along with the implementation of the Malaria control program made it possible for *pahadis* to clear-cut forests and develop settlements such as Chisang. Upon establishing themselves in these new settlements, people established feeder roads, linking their village with the East-West Highway to the north and other settlements further south.

The construction of the East-West Highway and the feeder road networks linked Chisang with the rest of the eastern Terai, the eastern Hill region, the capital city, Kathmandu, and the states of West Bengal and Bihar in India and has had a profound effect on the people of Chisang. Many people from Chisang were employed as construction workers and paid in cash, thereby, introducing the concept of cash wage labor in Chisang. Furthermore, with the construction of the highway, small trading towns were established where people from Chisang sold surplus food, fruits, livestock and poultry products. As previously stated, in recent times, a majority of the households in Chisang are growing cash crops which they transport and sell at the *hattiya*; the subsistence farm economy has been monetized and to some extent integrated with the national economy. Additionally, village people can travel to distant places in search of health care, employment opportunities and even a bride or groom for their loved ones. Regular bus service has made it possible for wage earners and day students to commute to jobs, schools and colleges in nearby towns.

The development of the transportation network has also enabled mobile family planning and maternal child health programs to set up camps in the study area. Local authorities organize vasectomy and laparoscopy camps at least two times a year. Government funded mobile clinics provide antenatal services at two locations within the study area each month. Others seek health care in Biratnagar. The

health and social workers employed by the sub-health post and the family planning and maternal/child health center have recruited and transported women to be sterilized in both Dharan and Biratnagar.

These findings are consistent with transcripts of interviews from Chisang in which the rationale for seeking health care and family planning services was associated with the expansion of the transportation network.

Even prior to the establishment of the sub-health post and family planning office nearby, those couples that had had enough children traveled by road to Dharan and Biratnagar for the operation. After the establishment of the health center in this area it became more acceptable for married women to seek other forms of family planning methods besides the operation... I am quite sure that more and more married women are using various family planning methods, especially now that trained people from Biratnagar travel to the village several times a month to provide these services (elderly mother with two married daughters).

Now that we have better roads and bus services even to small villages in this district it is no longer a problem for most married women to have access to family planning services. Only those women that are ignorant or those desiring at least a son do not seek family planning services... There are no family planning services available in my village and therefore I travel with other women from my village to Biratnagar by bus to be injected every few months. I am pretty sure that if there were no roads and bus service there would be fewer women from my village using family planning services (daughter of the above quoted mother, visiting her maiti, natal home).

The development of the transportation network may be contributing to ideational change, including a rise in age at marriage and increasing fertility control within marriage, and aspirations rising in this migrant community.

If it were not for the road to the village and the East-West Highway, it would not be possible for my 20 year old daughter to attend college in Belbari. She goes to the private college on the local bus. Now that she is attending college there, I realize that we will have to postpone her marriage for a few years. What good is it marrying her early if it is possible for her to remain home and still be able to receive college education as a result of improved transportation (42 year old married woman).

Expansion of Education

In 1963 the *Naya Muluki Ain* (New Law of the Land) was introduced. Among other regulations, this law stated that there was to be no discrimination on the basis of caste (HMG, 1963). Since then all primary, secondary, and tertiary educational institutions have been obligated to admit students of all castes and tribes. According to the village pundit, at first there was a lot of opposition in Chisang from the high and middle castes; however, in the last two decades, they have accepted the fact that low castes are also entitled to education.

In Chisang, many believe that increased schooling has affected not only the decisions made by younger couples at the start of their reproductive careers, but also the ideas of their parents (discussed below). There are at least three mechanisms through which schooling may have impacted on age at marriage and fertility control within marriage.

First, with the expansion of formal education both boys and girls are attending local schools and nearby colleges for longer durations. A Brahman girl about to complete her undergraduate education provided an explanation of the mechanism through which expansion of education increases age at marriage:

Unlike in the past, now it is more acceptable for girls to remain unmarried for longer periods of time, say until age 25, as long as they engage themselves in income generating activities and do not discontinue their education. Expansion of education in this part of the district has made it possible for women to further their education at the college level and remain unmarried into their 20s. I also think that the literacy and numeracy skills that are developed as a result of the expansion of education have helped many men and

women to earn cash incomes... I have already mentioned that those women earning cash incomes contribute to the household economy and are under less pressure to get married after they turn 18.

Another Brahman with four children noted the connection between schooling costs and social pressures on parents to limit fertility by accepting a modern family planning method:

When my children were too young to go to school, my wife and I were able to meet the costs of the children through our income from the little land we own. Now that three of our children go to school, my wife has had to raise green vegetables to sell in the *hattiya* in Pathari (a nearby town). I have started to work as a day laborer in Belbari from time to time... It is very difficult to afford to send three children to school... That is why my wife reminds me from time to time that we should have limited the number of children to two and used family planning services... My wife has also advised her younger sister to use a temporary family planning method until her two children grow up. Only then will my wife's younger sister be able to provide quality education to her two children.

Secondly, education generates new attitudes among educated men and women, young couples, and often among their parents. Caldwell (1980: 228) has stated that schooling speeds up cultural change. Indeed, schooling seems to influence ideas about family life, marriage and childbearing.

Now that I have completed my secondary education, and am attending college, it is in my interest to delay marriage until I am able to support my wife and family. This may also mean that I will have to set up a separate household (through partition) soon after my marriage and have only two children (unmarried male early 20s).

Finally, increased schooling leads to profound social change (Caldwell, 1980: 242). Both school aged children and older villagers associated education with national development. As a result of increasing educational opportunities in Chisang, children are growing up in an environment that is very different from the one in which their parents were raised (Hull, 1987: 93). Those with at least some education

look down the subsistence agricultural and the rural way of life. Education provides them with the social and economic advantages including the skills necessary to migrate to urban centers within Nepal and India i.e., in search of non-agricultural work. This was clearly stated by a 19 year old Dhimal boy who had returned to Chisang from his job in the Punjab, India:

After I failed SLC (high school certification) exams two years in a row, I wasted no time and ran away with some of my friends from school, first to Delhi, and moved on to Punjab. I have not yet passed my SLC exams but I know how to read and write and I am sure that no one can cheat me without my knowing it. I did not want to spend the rest of my life in Chisang grazing cows, and cutting firewood to sell on the black-market. Nobody who has gone to school for a few years will want that kind of job. Also, village life is too dull once you start living in a city.

Changing Role of Women

In Chisang, social norms for castes and women have been changing. This has paved the way for increased participation in agricultural work by high caste Brahmins and has increased demands for women's labor across all castes and tribes. According to the village pundit, today women of different castes and tribes do work which was prohibited in the past. This has resulted in an overall increase in the number of women working and has provided these women new avenues to earn cash income in Chisang and the nearby trading towns of Belbari and Pathari. In Chisang the only agricultural work still monopolized by men is ploughing fields.

The relaxation of social norms for women's behavior and additional markets available for their manual services have increased women's cash income and brought about significant changes in family structure and relationships. Married women under the age of 30 and those earning cash income are more likely to live in nuclear households. Married women living in joint or supplemented-nuclear households (that is, households with widow or widower living with married son and his family) are less likely to have cash income and more likely to work on the family land.

As far as fertility is concerned, married women living in a nuclear household in Chisang have an average of 3.2 children. Women

under the age 30 who live in joint or supplemented-nuclear households have an average of 4.1 children. In contrast, married women of all ages living in a joint or supplemented-nuclear household have an average of 5.6 children.

In Chisang three major changes in women's roles have created an environment conducive to the acceptance of family planning methods. A rise in the age of marriage has meant that in-marrying brides are more mature and more educated. This combination of increased formal schooling and maturity has resulted in more assertiveness; brides are less likely to be overwhelmed by their in-laws' desires. Additionally, the brides tend to desire a smaller family and are, therefore, more likely to use contraceptives, especially when they are available locally.

Recently married women and unmarried girls over the age of 14 are engaged in various income generating activities, mainly trading agricultural and forest products. In the majority of cases, the women control the cash income received from these economic activities. A married 28 years old Yakha woman explained the connection between nonfarm based income, delayed marriage and small family size:

I used to supply live chickens to various local hotels and restaurants before I got married. In fact I met my husband for the first time at a hotel in Belbari... Among all my friends with whom I went to school I was married last. As I was earning money by trading my parents did not pressure me to get married. Also, I have made small investments in this area and have many regular clients who prefer to trade with me. It has been difficult to maintain my trade and raise my two children... I think that I will not have anymore children.

Women participating in nonfarm based economic activities usually travel from home to their jobs in groups and therefore are likely to gain information on family planning methods from their peers.

As an owner of a small grocery shop in the village I have to travel to Biratnagar to get supplies at least two times a month. I was introduced to a family planning clinic in Biratnagar by my friends with whom I traveled to get supplies for my shop. Had I not been an owner of a shop, I do not think that it would have been necessary for me to travel to Biratnagar with other women from the village... I think that I would have still made use of

the family planning services but that would have been delayed by a few years (married woman).

The changing inter-caste, social and economic relationships in Chisang have made it necessary for women of all castes and tribes to work on the family land as well as to participate in income generating activities in nearby towns.

Since I wanted my youngest daughter to find work in a government office I sent her to school and on to college until the time of her marriage. As a result, she was married when she was 24 years old, that is about five to six years later than her two elder sisters. Unlike her two elder sisters who stay home and work on the family farm, my youngest daughter works for the local biogas company..... She also tells me that she is happy having only two children (56 years old Chettri woman).

Health and Family Planning Services

Family planning awareness got a boost in 1994 when a non-governmental organization (NGO) established an office in Chisang and began providing family planning services. This office was well organized and funded and was open several days a week. Women were encouraged to attend a series of informal discussion groups; the introduction of these informal group sessions was innovative and very popular among women in Chisang and neighboring villages. The office distributed contraceptives free or at a nominal price to men and women from the study area and provided training to a local Dhimal (*adhivasi*) woman who became a motivator for Chisang and eight nearby villages.

That same year a government sub-health post (SHP) was established within the VDC. The SHP was under-funded and thus lacked financial resources and trained manpower to perform many of its tasks; with three Village Health Workers (VHWs), it did provide immunizations, and some minor curative services, along with promoting contraceptive use.

In Chisang, a combination of major socioeconomic development and cultural change, together with the introduction of effective family planning services, has greatly increased the number of family planning acceptors in a short time period. The changing social, cultural, economic and political institutions have created an environment, which promotes use of family planning services among couples after they have reached their desired family size.

In the past villagers had genuine reasons to be fearful of operations (vasectomy and laparoscopy), as there was a lot of coercion from politicians and health care workers. In the last 10 to 15 years things have changed due to various development programs and the increased educational level of the villagers. They are less fearful of the family planning services and are more receptive to suggestions of the health care workers that promote health care and family planning services... These health care workers go door-to-door and advise the type of family planning method to be used according to the present family size and the couple's desires (representative of the VDC Council who completed undergraduate studies in Kathmandu).

Prior to the establishment of the SHP and the family planning office in the VDC in 1994, only two currently married Chisang women aged 15-49 reported that they had used temporary methods. Another six women were protected from pregnancy as either they or their husbands had been sterilized. After the local introduction of health care and family planning services the number of acceptors of both sterilization and temporary methods increased threefold. Over seven percent of men and 11 percent of women had been sterilized; 14 percent of women were using temporary methods. Even more remarkable is that the number of women using temporary family planning methods to space births ($n = 14$) is keeping pace with the numbers who are sterilized ($n = 18$). Hiring and training local women to promote contraceptive use in Chisang is another factor that has helped increase the number of contraceptive users.

Migration as a Catalyst for Change

As stated in previous sections, Chisang has attracted its share of migrants from the eastern Mountain and Hill regions and from all castes and tribes. The *pahadi* people relocated to Chisang because of various push and pull factors (on this point, see also Gurung, 1989). Furthermore, Chisang is characterized by a continuing pattern of out-migration (permanent and temporary) and seasonal migration to urban centers within Nepal and into India; the subsistence agricultural economy is no longer able to support the population of rural communities, such as Chisang. Out-migration from Chisang is related to a number of factors including: types of households, ability to supplement household income by off-land income, mobility resulting

from a better transportation network, higher educational levels and receptiveness to change.

According to various studies on the relation between migration and fertility in different parts of the world, the fertility of rural to urban migrants is generally lower than that of non-migrants at place of origin but higher than that of urban natives (Goldstein, White and Goldstein, 1998; Goldstein and Goldstein, 1981; Lee and Farber, 1985). It has been noted above that Chisang is a transitional village, one which does not fit the category of either rural or urban. Although this study did not examine the fertility of non-migrants at place of origin there is evidence that migrants are changing their fertility behavior.

Unlike in the hills, people who have migrated to this village no longer see early marriage of their daughters as a meritorious act. I will argue that many parents consciously delay marriage of their daughters as they contribute to the household economy... The recent migrants to the village along with the more established families seem to have realized the benefits of family planning services. They use the family planning services for two reasons-- to put an end to childbearing, and also to delay births so as to allow three to four years gap between children (village priest who migrated to Chisang from Khotang district).

Another man who had recently migrated from Ilam District with his wife and three children expressed his surprise when the female family planning motivator arrived in his temporary dwelling to provide information on the three month injection and sterilization:

My wife had to walk for eight hours to Ilam Bazaar to get the injection. She went there a few times but stopped going there, as there was no one at home to look after our children. Here, we receive the same services within half an hours walk from our house... The *dhimalni didi* (that is, family planning motivator) convinced my wife to start taking the injections as soon as possible... As migrants with no land and three mouths to feed, my wife agreed and has received the injection two times in the last five months.

Migrants from the adjoining hill districts who have settled in Chisang have regulated their childbearing patterns as a result of various contextual factors and to take advantage of a broad range of

opportunities. As migrants they have been innovative and regulated their fertility through a combination of higher age at marriage and fertility control within marriage.

Conclusion

Chisang is a transitional village, and as such can be categorized as neither a rural village nor an urban center. In Chisang fertility change is occurring as a result of changing sociocultural, economic and development factors including increased educational opportunities, changing roles of women and the local availability of family planning methods in addition to infrastructure changes. Many of the residents in Chisang village are migrants, and are therefore receptive to changing norms and practices. They are innovative and are breaking away from many traditional ways of thinking; one of these innovations is increased fertility regulation achieved principally by delaying age of marriage and increasing contraceptive use within marriage. This case study suggests that analysis of fertility changes in a village should not be viewed in isolation from regional or national socioeconomic changes that form the context of the fertility transition.

References

- Bongaarts, J. and R. G. Potter. 1983. *Fertility, Biology, and Behavior: Analysis of the Proximate Determinants of Fertility*. New York: Academic Press.
- Caldwell, J. C. 1980. "Mass education as a determinant of the timing of fertility decline." *Population and Development Review* 6(2): 225-255.
- Caldwell, J. C. and V. J. Hull (eds.). 1988. *Micro-Approaches to Demographic Research*. London: Kegan Paul International.
- Caldwell, J. C., P. H. Reddy, and P. Caldwell. 1982. "The causes of demographic change in South India: A micro approach." *Population and Development Review* 8(4): 689-727.
- Caldwell, J. C., P. H. Reddy, and P. Caldwell. 1983. "The social component of mortality decline: An investigation in South India employing alternative methodologies." *Population Studies* 27(2): 343-61.
- Caplan, L. 1970. *Land and Social Change in East Nepal: A Study of Hindu Tribal Relations*. London: Routledge & Kegan Paul.

- Caplan, L. 1991. "From tribe to peasant? The Limbus and the Nepalese State." *Journal of Peasant Studies* 18(3): 305-321.
- Caplan, P. 1972. *Priests and Cobblers: A Study of Social Change in a Hindu Village in Western Nepal*. London: Intertext.
- Coale, A. J. and T. J. Trussell. 1974. "Model fertility schedules: Variations in the age structure of childbearing in human population." *Population Index* 40(2): 185-201.
- Davis, K. and J. Blake. 1956. "Social structure and fertility: An analytic framework." *Economic Development and Cultural Change* 9(4): 211-235.
- Goldstein, S. and A. Goldstein. 1981. "The impact of migration on fertility: An 'own children' analysis for Thailand." *Population Studies* 35(2): 265-284.
- Goldstein, A., M. White, and S. Goldstein. 1997. "Migration, fertility and state policy in Hubei Province, China." *Demography* 34(4): 481-492.
- Gurung, H. 1989. "Regional patterns of migration in Nepal." *Papers of the East-West Population Institute* No. 113. Honolulu: East-West Center.
- His Majesty's Government of Nepal (HMG/N). 1963. *The Muluki Ain*. Part 3. Kathmandu: HMG/N. In Nepali.
- Hull, T. H. 1987. "Fertility decline in Indonesia: An institutionalist interpretation." *International Family Planning Perspectives* 13(3): 90-95.
- Karki, D. 1997. "The socio-cultural and economic contexts of fertility decline in the rural eastern Terai region of Nepal." Ph.D. dissertation. Palmerston North: Massey University.
- Knodel, J. 1983. "Natural fertility: Age patterns, levels, and trends." In *Determinants of Fertility in Developing Countries*. Eds. R. A. Bulatao and R. D. Lee. New York: Academic Press. Vol. 1, pp. 61-102.
- Lee, B. S. and S. C. Farber. 1984. "Fertility adaptations by rural-urban migrants in developing countries: The case of Korea." *Population Studies* 38(1): 141-155.
- Macfarlane, A. 1976. *Resources and Population: A Study of the Gurungs of Nepal*. Cambridge: Cambridge University Press.
- McNicoll, G. 1975. "Community level population policy: An exploration." *Population and Development Review* 1(1): 1-21.
- McNicoll, G. 1980. "Institutional determinant of fertility decline." *Population and Development Review* 6(3): 441-462.
- McNicoll, G. 1994. "Institutional analysis of fertility." In *Population, Development, and the Environment*. Eds. Kerstin Lindahl-Kiessling and Hans Landberg. Oxford: Oxford University Press. Pp. 199-230.

- Ministry of Health (MOH). 1997. *Nepal Family Health Survey 1996*. Kathmandu: Ministry of Health.
- Regmi, M. C. 1976. *Landownership in Nepal*. Berkeley: University of California Press.
- Regmi, M. C. 1978. *Land Tenure and Taxation in Nepal*. Kathmandu: Ratna Pustak Bhandar.
- Retherford, R. D. and S. Thapa. 1998. "Fertility trends in Nepal, 1977-1995." *Contributions to Nepalese Studies* Special Issue on Fertility Transition in Nepal, ed. S. Thapa, S. G. Neidell, and D. R. Dahal, 25(Special Issue): 9-58.
- Thapa, S. 1995. "The human development index: A portrait of the 75 districts in Nepal." *Asia-Pacific Population Journal* 10(2): 3-14.
- Thapa, S. and M. Friedman. 1998. "Female sterilization in Nepal: A comparison of two types of service delivery." *International Family Planning Perspectives* 24(2): 78-83.

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Understanding Fertility Transition: Back to Basics

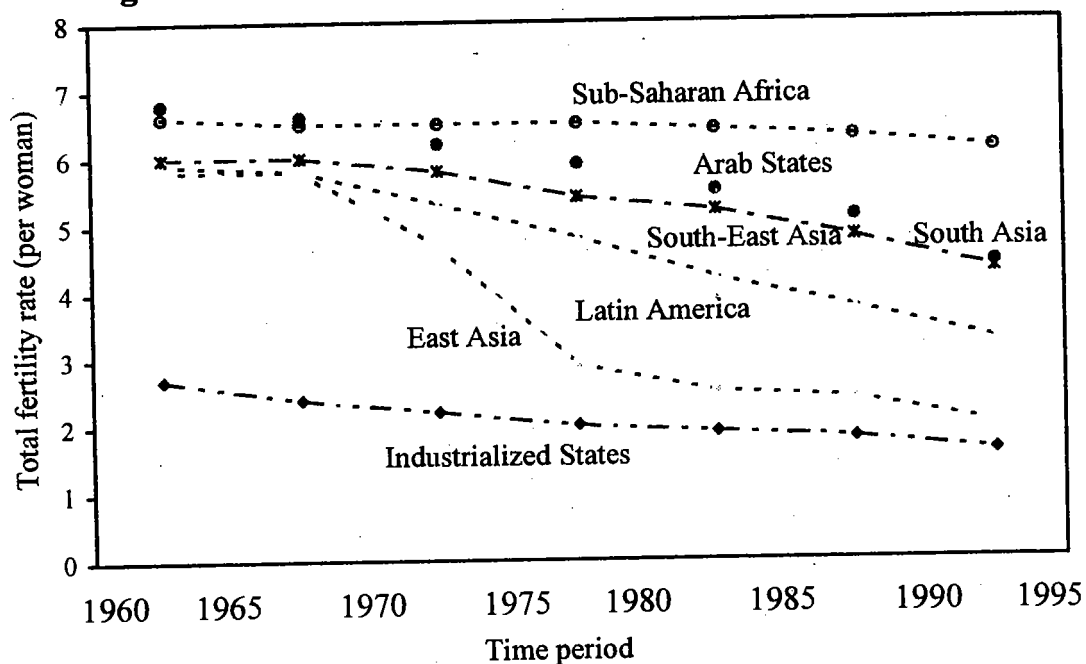
John Cleland

Introduction

Despite a huge investment of research funds over the past 30 years, there has been remarkably little progress towards an agreed theory of fertility transition. As demographic trends unfold, the gulf between certain dominant explanatory models and the raw evidence widens. This attempt to present a framework within which some real progress can be made towards a fuller understanding of the shift from high to low fertility thus starts with a description of what has happened to levels of childbearing in developing countries over the past 35 years. As will be shown, there are many obvious lessons to be drawn from a straightforward description.

Fertility Trends in Developing Countries, 1960-1990

Figure 1 summarizes trends in fertility over the period 1960-1995 for major developing regions. The chosen indicator of fertility is the familiar total fertility rate, a conversion of period age specific rates into implied lifetime numbers of births per woman. The data source is the United Nations Population Division. Many of the fertility estimates published by the United Nations are based on defective data and, in other cases, amount to little more than informed guesswork. However, there exists no superior international compilation of relevant information and the broad picture is undoubtedly valid.

Figure 1 Trends in total fertility

The early 1960s is an appropriate starting point for a review of fertility trends in developing countries. Prior to 1960, falls in fertility were very uncommon, being confined to a few city states and more developed islands. In 1960, total fertility rates in all eight regions considered here were contained within a rather narrow span of 5.8 to 7.0 births per woman. These levels are considerably higher than estimates for historical populations, which typically range from 4.0 to 6.0 births. It appears probable that widespread increases in fertility may have occurred in the first half of this century, as argued, for instance, by Dyson and Murphy (1985). Fertility levels were highest in East Africa and the Arab states of North Africa and Western Asia, and lowest in East and South-east Asia, primarily because of late marriage ages. Fertility declined first in Latin America. Leaving aside Argentina and Uruguay, which rightly belong to the earlier European fertility transition, Guzman (1993) dates the onset of decline to be in the 1960s for all countries of continental Central and South America, except Bolivia and Mexico, where it occurred in the early 1970s. Despite this remarkable synchronicity, the pace of decline varied considerably and, by the early 1990s total fertility ranged from over 5.0 births in Guatemala, to less than 3.0 in Brazil, Panama, Argentina, Colombia, Chile and Uruguay. No state in Latin America has yet reached replacement level fertility.

The immense diversity of Asia precludes any simple generalization about fertility transition in that region. However, analysis in terms of three sub-regions, East, South-east and South, mitigates the problem. East Asian trends (excluding Japan) are dominated by China and Figure 1 clearly shows the steep decline of the 1970s, followed by the relative stability of the 1980s. A 1992 survey conducted by the State Family Planning Commission suggests that a further sharp decline in fertility may have started in 1989. Contrary to the expectations of most experts on China, there was a further tightening of population policy at this time with a renewed emphasis in rural areas on a 4-year gap between first and second births, followed by sterilization. In Sechuan province, with a population of over 100 million, a one-child policy is being strongly enforced in the more prosperous, densely settled rural areas. It is now possible that total fertility in China is about 2.0 births or even lower.

Fertility in South Korea has fallen even further than in China and has been below replacement level for about a decade, giving rise to concerns about a future shrinkage of the labor force and rapid population aging. Since the late 1960s, the government has had a strong population control policy. It developed an extensive network of services and made considerable use of financial inducements to couples to adopt contraception. By contrast the regime in North Korea, a more prosperous and heavily industrialized state at the time of partition, has been hostile or indifferent to family planning. The onset of the decline in North Korea is thought to have occurred about a decade later than in the South, but over the last 20 years, the speed of decline has been slightly greater in the North leading to a convergence at low levels. Government policies, it appears, have in this instance influenced the timing of transition but not its medium-term outcome.

In South-east Asia, the onset of fertility decline coincides with that in East Asia but the pace of change has been more modest and total fertility was around 3.4 births in the early 1990s. This regional average masks considerable inter-country variability. Not surprisingly perhaps, period fertility is below replacement level in Singapore and is fast approaching this level in Thailand. The Indonesian regime has shared with the Thai government a strong commitment to reducing population growth and now records a fertility level of about 3.0 births.

There follows a group of countries—the Philippines, Vietnam, Malaysia, Myanmar and Cambodia—where the current level of childbearing is thought to lie in the range of 3.5 to 4.5 births. This group encompasses a huge diversity in standards of living and variation in population policies. Fertility declines began early in the Philippines and

Malaysia, both rather advanced socially and economically in the 1960s compared to other countries in the region; but levels of childbearing almost plateaued for a decade or more before resuming a downwards path in the 1990s. In the Philippines, the strong opposition of the Roman Catholic church to 'artificial' means of birth control has prevented successive governments from creating comprehensive family planning services while, in Malaysia, policies of population containment were reversed in the mid-1980s towards a much more expansionist vision of future population size. Fertility among the Malays actually rose in the 1980s though that of the Chinese and Indian communities continued to decline.

Demographic analysis of South-east Asia thus demonstrates vividly that simple generalizations about the socioeconomic determinants of fertility are unwarranted. For instance, high material and educational standards in Malaysia and the Philippines have not yet been translated into small family sizes. In 1960, adult literacy in the Philippines was 72 percent in contrast to 39 percent in Indonesia, and income per head estimated to be US\$230 compared to \$121 in Indonesia. There was also a large difference in life expectancy: 51 compared to 41 years. Yet fertility in the early 1990s was nearly one birth higher in the Philippines than in Indonesia.

South Asia, comprising the Indian sub-continent and extending west as far as Iran, contains about 20 percent of the world's population and represents the greatest numerical concentration of poverty. Fertility estimation in this region remains a highly contentious matter. In Iran, for instance, the UN estimates fertility in the early 1990s to be about 5.0 births though a recent analysis puts it at 3.5 births in 1993, which would represent a fall of nearly 50 percent in a decade (Ladier-Fouladi, 1996). In Pakistan and Nepal, recent surveys show steadily rising levels of contraceptive use. Interpretation of Pakistan's demographic data is controversial, but it is probable that total fertility has fallen from about 7.0 births in the early 1980s to under 6.0 births in the mid-1990s. In Nepal, a much poorer and less urbanized country, the level of childbearing is markedly lower than in Pakistan. The 1996 Family Health Survey indicates a total fertility of 4.6 births.

No discussion of India's fertility can ignore variations between states. In the four largest northern states—Madhya Pradesh, Rajasthan, Bihar and Uttar Pradesh—which together comprise nearly 40 percent of India's population, fertility has declined modestly with births per woman still in the range of 3.6 to 4.8 according to the 1992/93 National Family Health Survey. At the other extreme are the southern states of

Kerala and Tamil Nadu, where fertility is almost at replacement level. This north-south divide in fertility has been attributed to a gradient in the status of women (Dyson and Moore, 1983). Certainly, there is a strong relationship between female literacy and fertility at the state level.

The most unexpected demographic development in South Asia has taken place in Bangladesh. This country possesses none of the features thought to be conducive to fertility transition. It is predominantly rural, has low levels of adult literacy and school enrollment and still has high child mortality. Nevertheless, fertility declined in the 1980s by at least 30 percent from traditional levels of about 7.0 births per woman. The UN estimate for 1990-95 is 4.7; the most recent survey, conducted in 1996/97, indicates that 49 percent of couples are practicing contraception and that fertility may be well under 3.5 births. This steep decline represents a serious challenge to most theories of transition. Indeed, a poverty-induced reproductive change appears more plausible than a development-induced one. Yet even this thesis can muster little empirical support. Fertility decline has been rather even across economic strata and there is thus no obvious link between reproductive behavior and extreme poverty of landlessness.

UN estimates for East, West and Central Africa show constant high fertility over the entire 30-year span. For West and Central Africa, this picture may be correct. However, there is evidence of incipient declines among younger women in Senegal, south-west and south-east Nigeria and Ghana. But other countries with recent relevant evidence still record unchanged levels. The latter include Togo, Mali, Liberia and Cameroon. The UN portrayal of East Africa, however, is somewhat misleading; the impression of constant high fertility is the result of upwards adjustments of estimates for Ethiopia and Uganda that offset declines in Kenya and Zimbabwe. The change in Kenya is remarkable. In the late 1970s, surveys in Kenya depicted a highly pronatalist society. Total fertility was about 8.0 births per women, only 16 percent of currently married women reported that they wanted to have no more children and only 7 percent were using contraception. Only ten year later, little short of a reproductive revolution had taken place. Fertility had fallen to about 5.5, over 30 percent were practicing contraception and, perhaps most significantly, the proportion claiming to want no more children had risen to 49 percent.

However, Kenya and Zimbabwe are not, as so often is claimed, in the forefront of fertility transition in sub-Saharan Africa. That label rightly belongs to the black population of South Africa. According to

the results of the most recent survey, total fertility among the black population was about 4.6 in the period 1987-1989 and about 50 percent of currently married women were practicing contraception. Moreover, the decline is a long-standing one that may have begun as early as the 1960s. Other countries in Southern Africa—Botswana, Swaziland, and Namibia—have also experienced declines though not on the scale of South Africa.

Table 1 shows estimates of contraceptive use in sub-Saharan Africa over the past 25 years. The overall impression is clear. The use of birth control is rising rapidly throughout East and Southern Africa

Table 1 Percentage of currently married women using any method of contraceptive

Region and Country	Period				
	1975-79	1980-84	1985-89	1990-94	1995-
East & Southern					
Eritrea					8
Ethiopia			4		
Kenya	7	17	27	33	
Uganda			5		15
Rwanda		10		21	
Burundi			9		
Malawi		7			22
Zimbabwe		38	43	48	
Zambia				15	26
Botswana		28	33		
Swaziland			21		
South Africa			47		
(Black population)					
Tanzania			10		18
Namibia				29	
Madagascar				17	
West & Central					
Mali			11		7
Niger				4	
Senegal	4		5	7	
Liberia			6		
Cote d'Ivoire		3		11	7
Ghana	10		13	20	
Togo			12		
Benin		9			
Nigeria		5		6	
Cameroon	2			16	
Guinea				5	
Burkina Faso				8	

but is rising much slower elsewhere in the continent. Until recently, many population experts were profoundly pessimistic about the prospects of fertility decline in sub-Saharan Africa and maintained that uniquely pronatalist features of culture and social organization in the region might buttress high fertility regimes until a relatively late stage of socioeconomic development. Events of the 1980s and 1990s have demonstrated that reproductive behavior in that region is not as immutable as previously thought. Indeed it appears likely that much more widespread decline will take place in the near future in East and Southern Africa and will begin to take root in Central and Western Africa.

The final developing region to be considered is North Africa and Western Asia, comprising most of the Arab states, plus Israel and Turkey. The range of living standards is very wide. At one extreme are the United Arab Emirates, Kuwait and Saudi Arabia—classified as high-income countries. At the other end are Sudan and Yemen with annual incomes per head of less than US\$500. In the region as a whole, fertility has fallen by about 30 percent over the last 30 years, from 6.8 to 4.7 births. The onset and depth of decline, however, has little obvious connection with wealth or degree of urbanization. Recent results from the Gulf Child Health Survey program confirm that total fertility remains high in Saudi Arabia (6.5), among the indigenous population of Kuwait (6.5) and in the United Arab Emirates (5.9) (Farid, 1993). Conversely, fertility decline started earlier and has advanced further in countries with modest standards of living such as Egypt, Tunisia and Morocco, where total fertility lies within the range of 3.4 to 4.4. In the Arab world, the imprint of divergent population policies is clearly evident. Egypt, Tunisia and Morocco are among the few Arab countries where support for family planning has been unequivocal. Conversely, many other Governments have welcomed the prospect of expanding population—in some cases, because it implies a lessening dependence on imported labor—and have been hostile to the promotion of family planning. This factor goes some way to explaining the persistence of high fertility in affluent, highly urbanized and increasingly educated countries.

This descriptive review of what has happened to fertility leads to a number of important conclusions:

1. There is clearly no economic or social threshold that societies have to cross before fertility levels start to decline. Family sizes have fallen in affluent and in very poor countries; in settings where the vast majority of the adult population has received formal schooling and

where most adults are illiterate; in countries where women participate in public life and paid employment and in those where women are still largely excluded from public life.

2. Equally, it appears true that fertility has already fallen or is about to fall regardless of religious or cultural features of societies. For instance neither Islam nor the distinctive characteristics of African social organization act as absolute barriers to fertility transition.

3. Public policies to curb rapid population growth clearly have not been a necessary precondition for fertility decline. The level of childbearing has fallen against a background of government hostility or indifference to the provision of family planning services (e.g., Myanmar, North Korea). More commonly, spontaneous declines were already underway before the initiation of government population policies (e.g., Thailand, many countries of South America). In other countries, however, family planning programs may have had a crucial influence on the timing and speed of decline.

4. Within the next decade, it seems highly probable that all countries of the world, without exception, will have entered the phase of fertility decline. Thus, over a span of 40 to 50 years, huge changes in childbearing behavior will have swept the entire developing world. To contemporary observers, impatient for evidence of change, this may seem an extended span. Seen against the context of human history, however, it is a remarkably short period of time.

Mortality-Fertility Links: A Brief Synopsis of Earlier Theory and Research

The last conclusion is the most important one because it implies that we should be searching for some underlying common cause for what is about to become a global phenomenon. As suggested earlier, the identification of a common economic, social or cultural condition (or set of conditions) that underlies fertility decline appears to be doomed. But one important feature that does unite all developing countries is the steep falls in mortality that have given rise to the present era of rapid population growth.

The link between mortality decline and fertility decline was an essential part of classical expositions of demographic transition. All visual representations of transition show a fall in the death rate preceding a fall in the birth rate. Essentially two interrelated ideas lie at the heart of this sequence. The first, which may be termed the modernization thesis, is that technological advance initially impinges on

mortality. No society seriously resists the prospect of higher survival and thus few barriers impede or deflect the impact of technological advance on this domain of human life. Reproduction, however, is a different matter. In all societies, procreation is subject to an array of moral beliefs and social sanctions. Many of these act to sustain high levels of childbearing. Hence, the impact of technological advance is initially blunted by opposing forces and there is a lag in its effect on fertility.

The second idea posits a more direct influence of mortality decline on fertility. In high mortality countries, it is argued, couples have to give birth to large numbers of children simply to ensure that a few will survive to form the next generation. When mortality declines, this reproductive imperative is undermined. After a lag, couples realize that fewer births are needed to achieve some specified desired number of surviving children and reproductive behavior is adjusted accordingly.

These basic ideas were subsequently elaborated at the individual and family level. As evidence about the effect of lactation on ovulation accumulated, it was realized that one pathway linking mortality to fertility was purely physiological. An early child death interrupted breastfeeding and thus allowed an earlier return of ovulation than otherwise would have been the case. A distinction was made between the replacement effect of child loss on family formation and the insurance effect. The first pathway represents the tendency of couples to react to child death by bearing an additional child to replace the dead one. The second pathway refers to the apparent need of parents to anticipate the possibility of death of their children by bearing more than they want.

Research interest in mortality-fertility links flourished in the 1960s and 1970s (e.g., Heer, 1966; Preston, 1978) but has attracted little attention in the past 15 years. There are several reasons for this lapse of interest:

1. The Princeton study of the European fertility transition demonstrated that the expected sequence of steep mortality declines followed by falls in fertility did not hold universally. In some countries (e.g., France), fertility decline appeared to precede the mortality transition. In others (e.g., Norway), there was an exceptionally long lag between improved survival and any fertility response. In yet others (e.g., England), declines in childhood mortality and fertility occurred in parallel.

2. Empirical research on the physiological and replacement links between child deaths and reproductive behavior revealed rather

modest effects. Table 2 illustrates the magnitude of the physiological effect of a neonatal death on the following birth interval length for a number of non-contracepting populations in the 1970s. While an appreciable impact of death on birth interval length is apparent, it is also clear that, given prevailing levels of infant mortality in the 1970s, the purely physiological effect is not of major significance. Similarly, in a

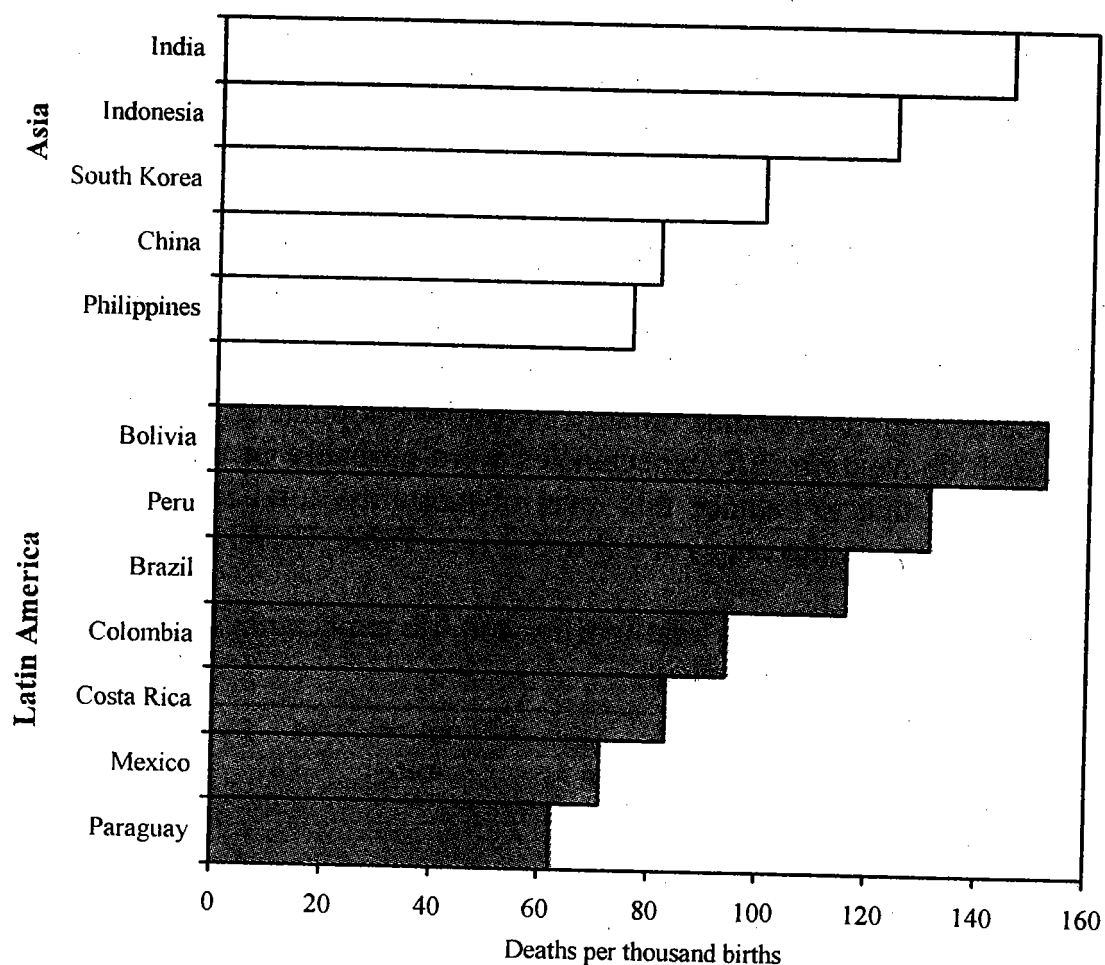
Table 2 Physiological effects of neonatal mortality on median interval between birth 3 and birth 4 (non-users of contraception)

Country	Survived		
	Died	12+ Months	Difference
Colombia	15.0	23.3	8.3
Indonesia	24.1	30.3	6.2
Malaysia	17.5	24.3	6.8
Pakistan	19.8	29.1	9.3
Peru	19.4	25.8	6.4
Sri Lanka	21.2	28.6	7.4

review of evidence concerning the replacement effect, Preston (1978) concluded that parents who had lost a child were only 20-30 percent more likely to proceed to the next parity than parents who had not lost a child. Again, the demographic significance of this type of replacement behavior was modest.

3. While aggregate or national-level studies have consistently found life expectancy, along with literacy levels or education, to be the strongest correlates of fertility level or fertility decline (e.g., Cutright, 1983), there is no straightforward or mechanical relationship between the two. Figure 2 derived from work by Casterline (1993) and Guzman (1993) illustrates this point for Asian and Latin American countries. At the onset of fertility transition, the level of infant mortality ranged from 150 deaths per 1000 births to 50.

4. Throughout much of the last 20 years, rather narrow economic theories of fertility decline held an intellectually dominant position. The following stereotype became entrenched. In traditional societies, parental demand for children was high because utility of children was high. Fertility decline was seen primarily as a response to structural forces that reduce the benefits of children to parents and raise their costs. Within this framework, there is no necessary link between mortality and fertility. Parents may continue to bear many children, even when child mortality is low, provided that the perceived cost-benefit calculation is still favorable to childbearing.

Figure 2 Infant mortality at start of fertility decline, 12 countries

Towards a Restatement of the Importance of Mortality

Decline in Fertility Transition Theories

The first step in this attempt to reappraise fertility transition theory and to reinstate the crucial underlying role of mortality decline is to clarify the nature of pre-transitional fertility. A valid understanding of pre-transitional fertility is essential for any attempt to explain the transition to low fertility.

As evidence about fertility in historical societies grows, the stereotype of high fertility buttressed by high demand for children is being steadily eroded. This evidence has been recently summarized by Wilson and Airey (1997). What emerges clearly from their review is that human fertility in historical societies for which evidence is available (e.g., China, Japan, many European countries) was moderate-typically in the range of 4.5 to 6.0 births per woman. Clearly there must

have been very powerful checks on fertility, either through restrictions on marriage (the prime mechanism in Western Europe) or via checks on childbearing within marriage (e.g., prolonged lactation, abstinence, abortion). Together with evidence that infanticide, child neglect and abandonment were common features of many traditional societies, the fact that fertility levels were so low over many centuries largely destroys the myth that pre-transitional societies were strongly pronatalist. Moreover, the very slow growth rates of most human populations until the modern era implies that human societies are adapted to no more than two surviving children on average per woman.

The demographic situation at the start of this century in developing regions was thus broadly as follows: population growth was not much above zero, life expectancies were probably in the range of 25-35 years and, to balance this level of mortality, total fertility rates must have been in the range of 3.9 to 5.3 (see Table 3). What happened

Table 3 Combinations of total fertility and life expectancy at birth that produce zero population growth

Life expectancy	20	25	30	35	40
Total Fertility	6.64	5.31	4.46	3.87	3.10

Source: Wilson and Airey (1997).

thereafter is familiar. Some developing countries experienced a gentle downwards drift in mortality in the first half of the century, but all countries saw dramatic improvements following the second world war. Table 4 illustrates this point. It shows percent distributions and mean numbers of surviving child for women aged 40-44 interviewed in 19 World Fertility Survey enquiries of the late 1970s. These women would have experienced their peak fertility some 20 years earlier, in the late 1950s.

Though of course some of the surviving children recorded in these surveys were destined to die subsequently, the vast majority survived because they had already passed through the high risk years of infancy and early childhood. The table shows that this cohort of women had averages of between four and six surviving children. The proportions childless are low, typically below five percent, but the proportions with at least six surviving children range from 40 to nearly 60 percent with only three exceptions. It should be stressed that this group of 19 countries includes some (e.g., Bangladesh, Nepal, Pakistan, Peru) that had exceptionally high childhood mortality in comparison with most developing countries at that time.

Table 4 Percent distribution of ever-married women aged 40-44 according to number of surviving children

Region and Country	Children Surviving				Mean
	0	1-2	3-5	6+	
Asia and Pacific*					
Bangladesh	4.4	12.0	40.4	43.2	5.1
Fiji	4.6	11.9	31.3	52.2	5.6
Indonesia	6.7	21.1	43.6	28.7	4.1
Jordan	2.7	4.9	16.4	76.0	7.2
Korea	1.8	11.9	59.2	27.1	4.5
Malaysia	3.2	12.8	35.1	48.8	5.4
Nepal	6.3	21.8	49.5	22.5	3.9
Pakistan	5.5	10.7	40.4	43.4	5.0
Philippines	2.7	9.4	31.0	57.0	6.0
Sri Lanka	5.0	16.7	37.8	40.6	4.9
Thailand	3.2	14.0	38.0	44.7	5.1
Caribbean and Latin America					
Colombia	3.9	13.8	31.8	50.6	5.7
Costa Rica	2.3	13.3	33.9	50.9	6.0
Dominican Republic	7.3	11.1	32.1	49.6	5.5
Guyana	8.3	11.2	27.1	53.2	5.7
Jamaica	8.1	20.7	27.6	43.8	4.9
Mexico	3.9	12.7	26.1	57.3	6.0
Panama	3.8	13.5	39.0	43.6	5.3
Peru	2.8	11.2	41.9	44.1	5.2

*Including West Asia.

These World Fertility Survey data demonstrate vividly that by the late 1950s a revolution in child survival had swept the developing world, doubling or trebling numbers of surviving children from the historical norm of two per family. Initially this improvement in survival may have been greeted with enthusiasm but sooner or later the negative consequences became apparent. Nearly all careful micro-economic studies have come to the conclusion that children consume more than they produce until at least the teenage years, even in agrarian societies (e.g., Mueller, 1976; Stecklov, 1997). Here surely is the underlying fundamental cause of the Third World fertility revolution and the origin of the latent demand for fertility regulation.

The steep mortality declines of the post second world era had another important consequence, rapid population growth, which in turn gave rise to massive international investment in the promotion of birth control. There is not space here to discuss the role of population policies and family planning programs in fertility transitions. As mentioned

earlier, they are clearly not a necessary or perhaps a sufficient cause of fertility decline. Nevertheless the balance of evidence suggests that they have played a key role in triggering demographic change in many Asian societies. More importantly but less often discussed is the role of government or official opposition to birth control in delaying the onset of fertility change.

Conclusion

The central message of this paper is that, in their search for explanations of fertility declines in developing countries, most population scientists have overlooked the obvious and have prematurely discarded classical theories that contain the key to a better understanding. In particular, the role of massive increases in life expectancy as a precondition for fertility transition in developing countries needs to be brought again to the forefront of explanatory frameworks. We need to return to basics.

Of course, I am not claiming that prior mortality declines offer a complete and satisfying explanation for the timing and course of fertility transition in particular countries. Some societies have been relatively quick to respond to the improved mortality regime; others very slow. Why these variations in the fertility response to mortality decline exist is an interesting but as yet unresolved question. I very much doubt, however, whether a standard or universal answer exists. It is much more likely that explanations of the precise timing, nature and speed of fertility transitions need to be sought on a country-by-country basis. In this search, the correct question to ask is not "Why did fertility fall?" but rather "What forces—economic, political, cultural, social—acted to delay the inevitable fertility response to improved survival?"

References

- Casterline, J. 1993. "Fertility transition in Asia." In *The Onset of Fertility Transition in Sub-Saharan Africa*. Eds. T. Locoh and V. Hertrich. Liege: Ordina.
- Cutright, P. 1983. "The ingredients of recent fertility decline in developing countries." *International Family Planning Perspectives* 9: 101-109.
- Dyson, T. and M. Moore. 1983. "Kinship structure, female autonomy and demographic behavior." *Population and Development Review* 9: 35-60.
- Dyson, T. and M. Murphy. 1985. "The onset of the fertility transition." *Population and Development Review* 1: 399-440.

- Farid, S. 1993. "Family planning, health and family well-being in the Arab world." Paper presented at Arab Population Conference, Amman.
- Guzman, J. M. 1993. "The onset of fertility decline in Latin America." In *The Onset of Fertility Transition in Sub-Saharan Africa*. Eds. T. Loefer and V. Hertrich. Liege: Ordina.
- Heer, D. M. 1966. "Economic development and fertility." *Demography* 3: 423-444.
- Ladier-Fouladi, M. 1996. "La transition de la fecondite en Iran." *Population* 6: 9101-1127.
- Mueller, E. 1976. "The economic value of children in peasant agriculture." In *Population and Development: The Search for Selective Interventions*. Ed. R. Ridker. Baltimore: The Johns Hopkins University Press.
- Preston, S. H. 1978. "Introduction." *The Effect of infant and Child Mortality on Fertility*. Ed. S. H. Preston. New York: Academic Press.
- Stecklov, G. 1997. "Intergenerational resource flows in Cote d'Ivoire." *Population and Development Review* 23: 525-554.
- Wilson, C. and P. Airey. 1997. "What can transition theory learn from the diversity of low-growth demographic regimes?" Paper presented at annual meeting of Population Association of America, Washington DC, March 27-29.

ABSTRACTS

The Global Fertility Transition and Nepal

JOHN C. CALDWELL

The global fertility transition has now been progressing for two centuries and still not all countries have begun their fertility declines. The first to do so was France in the late eighteenth century. The most recent is Nepal which is now the poorest country in the world with declining fertility, although at the onset of its decline it probably compared in per capita income with Bangladesh and possibly with France at their onsets. New data sources now allow us to compare fertility transitions across the world in terms of the speed of declines in individual countries and in the diffusion of their onsets from one country to another across regions. The similarities, at least over the last 125 years, are more striking than the differences. The Nepal decline is a typical Asian one with leadership provided by the government and elites, and resembles India in the predominant role played by sterilization. Nepal's fertility transition is of particular interest in three ways: (1) the low per capita income at which it is occurring; (2) the difficult topography of the country, which divides the population into those with easy access to the outside world who have joined the global economy and exhibit declining fertility and those without roads or schools who are still characterized by stable high fertility; and (3) the reliance for most fertility control on sterilization.

Fertility Trends in Nepal, 1977-1995

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SHYAM THAPA

This article presents estimates of fertility trends in Nepal for the period 1977-95, derived from two national surveys—the 1991 Nepal Fertility, Family Planning and Health Survey (NFFPHS) and the 1996 Nepal Family Health Survey (NFHS). Various fertility measures are estimated, including age-specific fertility rates (ASFRs), the total fertility rate (TFR), period parity progression ratios (PPPRs), and the total fertility rate and the total marital

fertility rate derived from PPPRs (TFR_p and $TMFR_p$). Trends in these measures are estimated for the 15-year period before each survey in the case of ASFRs and the TFR, and for the 10-year period before each survey in the case of PPPRs, TFR_p , and $TMFR_p$. For any given fertility measure, each survey yields a trend for years before the survey, and the two trends estimated from the two surveys overlap during some of these years. If the data were perfect, the two trends would coincide during the period of overlap. But the data are not perfect, and the trends do not coincide. Analysis of the discrepancies allows an improved assessment of the true trend in fertility. The principal finding is that fertility has been declining somewhat more slowly than commonly thought. The total fertility rate is estimated to have declined from 5.80 to 4.95 between 1977 and 1995. It declined more rapidly in urban areas than in rural areas, and more rapidly among women with more than a primary education than among women with a primary education or less.

Tamang Transitions: Transformations in the Culture of Childbearing and Fertility among Nepal's Tamang

DILLI R. DAHAL

THOMAS E. FRICKE

This article reviews significant findings from over 15 years of research on the culture of fertility and family transitions in two Tamang communities of Nepal. Data sources include both qualitative ethnography and quantitative survey materials collected from the collaborative Tamang Family Research Project. Major findings indicate that behavioral transitions in familial and childbearing patterns are closely associated with changing economic contexts away from earlier subsistence production to increasing involvement in the monetized economy. More recently, research has further indicated the beginnings of transitions in the cultural contexts of family and identity. The authors suggest that the moral entailments of Tamang patterns of meaning are the key to variations in behavior in response to changing material conditions.

Fertility Transition in Kathmandu

RAM HARI ARYAL

Using data from a survey carried out in Kathmandu in 1997, this paper analyzes the onset of the fertility transition. The analysis uses the index of marital fertility control (m) and parity progression ratios to document the onset of fertility changes. The results show that women tend to have children shortly after marriage. Nevertheless, there is evidence of a transition toward two and three child families. Additionally as educational attainment rises, women's fertility declines.

Determinants of Fertility in the 1970s and 1990s in Nepal

LAXMI BILAS ACHARYA

Using data from the 1976 Nepal Fertility Survey and the 1996 Nepal Family Health Survey this paper examines how selected socioeconomic variables and two proximate factors, age at marriage and ever use of contraception, affect both recent and cumulative fertility. The total change in fertility is decomposed to assess the extent to which changes in fertility behavior were due to compositional changes in the distribution of women or were net of these effects. The results show that socioeconomic variables have begun to play an important role in fertility reduction. Age at marriage has a strong inverse association with cumulative fertility; contraception, however, has a positive association. This could be due to the tendency for Nepali couples to use contraception only after achieving their desired family size.

Moslem and Non-Moslem Fertility Differences in the Eastern Terai of Nepal

SHARA G. NEIDELL

BHANU B. NIRLA

S. PHILIP MORGAN

SHARON STASH

Using data collected in early 1997 from three religious/ethnic groups (Moslems, Mahato and Tharu) in the Eastern Terai of Nepal we examine the effects of religious/ethnic differences, other background variables and measures of women's autonomy on reproductive behavior. Moslem women have lower levels of autonomy, greater desires for additional children and are less likely to be using

contraception than either Mahato or Tharu women. Multivariate analyses reveal the persistence of these religious/ethnic variations, thereby suggesting that women's autonomy differences cannot explain differences in reproductive behavior. We discuss other explanations for these fertility differences.

Socioeconomic Changes, Women's Autonomy, and Timing of First Birth in a Semi-Urban Community in Nepal

DEVENDRA P. SHRESTHA

Using micro-demographic data gathered from a single ethnic group, the Newars of Kirtipur in the Kathmandu Valley, this paper examines the influence of family and individual experience variables on the timing of the first birth in the context of social transformation. The cohort analysis finds that the first birth interval has been declining in the study community. The results show significant effects of birth cohort, respondent's outside exposure before marriage and the interaction term, gift times time. The effects of several other variables, while not significant, are in the expected directions, suggesting that women's literacy, higher age at marriage and having one's own choice of spouse may encourage the establishment of intimacy between a husband and wife and, therefore, lead to a shortening of the first birth interval.

Regional Patterns of Fertility in Nepal

BHIM P. SUBEDI

Using ecodevelopment regions as the units of analysis and data from the 1971 and 1991 population censuses, this paper examines regional-level changes in fertility and its association with selected development factors. The results suggest a mixed pattern of fertility changes in the 15 ecodevelopment regions during the 20-year period. Fertility has clearly declined in two of the 15 regions, which are characterized by high levels of social and human development. In some districts there is a plateau in the level of fertility, while in other areas, fertility may even be rising. Some of the apparent differences and changes may be related to the quality of the data as well as changes in mortality. These preliminary results suggest further research is needed to understand fertility differentials at the regional level in Nepal.

Women's Autonomy and Reproductive Behavior in Two Urban Areas of Nepal

BHANU B. NIRLA

DOVAN LAWATI

Based on data collected in 1997, this paper examines the interrelationship between gender roles, women's autonomy and fertility behavior in two urban settings, one in the hill and the other in Terai. The results confirm gender-specific division of work. The Terai setting, however, shows comparatively more gender-balance in tasks performed and decisions made than the hill setting. Following from this, women's autonomy in the Terai was found to be higher than in the hill. This is not, however, associated with differential patterns of reproductive behavior. The hill women, in spite of their lower autonomy, are less likely to have an unmet need for contraception than those in the Terai. We surmise that there may be some threshold level of modernization above which further improvements in women's autonomy may not lead to continued increases in contraceptive use.

The Contextual Web of Fertility Control: A Case Study of Chisang Village

DEBENDRA KARKI

The paper examines how various village and family/individual level factors have triggered measurable changes in reproductive attitudes and behavior in Chisang, a village in the Eastern Terai of Nepal. The research design employed a combination of survey questionnaires and unstructured interviews, complemented by participant observation. In Chisang, fertility change is occurring as a result of changing sociocultural, economic and development factors including increased educational opportunities, changing roles of women and local availability of family planning methods in addition to infrastructure development. This case study underscores that analysis of fertility changes in the village should not be viewed in isolation from the regional or national socioeconomic changes which form the context of the fertility transition. The majority of the Chisang residents are migrants, and are therefore receptive to changing norms and practices. They are innovative and are breaking away from many traditional ways of thinking; one of these innovations is increased fertility regulation achieved principally by delaying age of marriage and increasing contraceptive use within marriage.

Understanding Fertility Transition: Back to Basics

JOHN CLELAND

A review of developing country demographic trends since 1960 demonstrates that fertility decline has occurred in a wide range of economic, social and cultural circumstances and that it will probably become universal in the near future. It is argued that the huge gains in life expectancy that occurred in the twentieth century constitute the most plausible underlying cause of the near-ubiquitous falls in fertility. However, explanations of the precise timing and speed of national fertility transitions need to take into account many other factors.